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Steel Scrap in Various Foundry Mixtures

Effect on the Properties of Castings Shown by Extensive Results—Useful Characteristics of Semi-Steel and Causes of Its Failure

BY G. S. EVANS*

IN VIEW of the interest that is being manifested in semi-steel at this time, as indicated by recent articles on the subject by Mr. Dyer, Dr. Richard Moldenke and David McLain, in THE IRON AGE of March 2 and 30, I will undertake to show some practical results that have been obtained by the use of steel scrap in the different classes of castings produced in the foundries of which the writer is superintendent.

STEEL SCRAP CARWHEELS

When the writer first became connected with the company* several years ago the wheel mixture consisted regularly of different grades of charcoal pig iron and scrap wheels, the mixture being made by fracture grading. A large percentage of the wheels had been rejected by the railroad inspector on account of either drop or thermal failures.

At once a small percentage of scrap steel was added in place of a portion of the No. 6 and 7 grades of charcoal pig iron, the mixture or charge being figured on the analysis basis instead of by fracture, and immediately an improvement was noticed in the strength of the wheels. By degrees this was increased to from 10 to 12 per cent, which is about the limit that can be used in wheels when more than 75 per cent of the charge is to be composed of rejected wheels. This greater addition of scrap steel improved the strength of the finished wheels still more, and besides replacing the more expensive charcoal iron, allowed of the use of cheaper pig iron (coke iron) for, by the use of scrap steel coupled with good foundry practice, it is possible to produce the proper chilling qualities in metal made from charcoal and coke iron mixtures alike. The previously mentioned changes in the mixture were evolved as a result of experiments which lasted over a period of several months.

While the use of scrap steel alone made it possible to use a cheaper grade of pig iron, thereby affecting enormous savings in the cost of the mixture, the enormity of which can be determined by figuring the difference in cost of charcoal and coke iron when they constitute 15 per cent of a 100-ton daily melt, it only partly accounted for the increase in strength of the finished wheels, this being very largely due to improvements in foundry practice.

GENERAL LOCOMOTIVE AND CAR CASTINGS

Ten per cent of scrap steel is regularly carried in the mixtures for this class of castings, the other components being 30 to 40 per cent pig iron and 50 to 60 per cent machinery and returned scrap. The analysis of the melt shows:

1.90 to 2.15 per cent silicon, 0.06 to 0.085 per cent sulphur, 0.45 to 0.55 per cent manganese, 0.65 to 0.80 per cent phosphorus and 3.30 to 3.55 per cent carbon.

This is the regular gray-iron foundry mixture, from which it is possible to pour both locomotive and car castings and ordinary stove plate as well, producing a good grade of castings in all cases. In this mixture I have found that the use of steel closes the grain of the casting and increases the strength without affecting the chilling qualities sufficient to cause any trouble, even in very thin sections. Experiments have demonstrated beyond a doubt that the use of steel in this mixture produces a cleaner iron, which probably results from changes either in melting practice, incident to the use of steel, higher temperature of the melt due to higher melting temperature of steel, or to the violent reaction between the steel and the other components of the melt, due to the wide variation in

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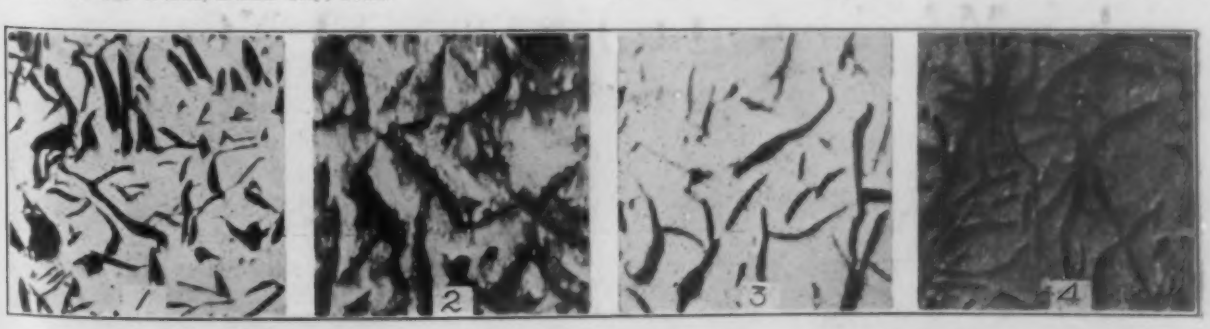
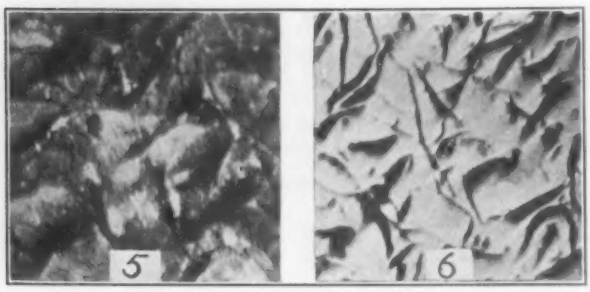


Figs. 1 and 3 are Unetched Photomicrographs, 100 Diameters, of Iron for Special Locomotive Castings Containing 25 to 40 Per Cent of Steel and Having a Transverse Strength of 3241 and 3610 Lb., and a Tensile Strength of 33,240 and 35,792 Lb. Per Sq. In. Respectively. Fig. 2 (150 dia.) and Fig. 4 (100 dia.) are the same but etched with picric acid.



Figs. 5 and 6 are Photomicrographs (150 and 100 dia.) of Semi-Steel (High Silicon) with a Transverse Strength of 2951 lb., and a Brinell Hardness of 202. Fig. 6 is etched with nitric acid.

the composition of each, as they mix in the reservoir of the cupola, throwing out impurities of less affinity as a result of the reaction (somewhat similar to the reaction that takes place in the duplex process for making open-hearth steel).

GENERAL EFFECT OF ADDING STEEL

The above mentioned mixtures carry only a small percentage of scrap steel and are not usually termed semi-steel, yet this is an essential component of the mixture, the effects of which can be seen in the finished castings. While the use of scrap steel in these amounts tends toward improving the quality of the casting, it does not, in so far as I am able to determine, give any distinctive characteristics to the metal that would warrant any claims for it other than that of being a good grade of machinery or chilled castings as the case may be.

The subsequent classes, as will be described, carry larger percentages of steel and when properly melted produce an iron with characteristic properties, especially as to strength, "toolability" and resistance to certain service conditions which we have, so far, been unable to obtain without the use of steel, even though we were able to procure iron of the same identical chemical analyses, as shown by the ordinary elements in both cases. Under ordinary foundry conditions, such castings are more expensive to produce, are more efficient for certain specific uses and consequently demand a higher price regardless of the name.

SPECIAL LOCOMOTIVE CASTINGS

Cylinder bushings, packing rings, valves and steam fittings which are subjected to a high pressure and hard wearing service constitute a group of special locomotive castings. From 25 to 40 per cent scrap steel is carried in mixtures for making these special castings, the other components being 10 to 15 per cent scrap carwheels, 10 to 15 per cent return scrap and 40 to 50 per cent pig iron. The analysis of the melt will show, depending on the class of castings:

From 0.90 to 1.50 per cent silicon, 0.06 to 0.100 per cent sulphur, 0.50 to 0.85 per cent manganese, 0.20 to 0.40 per cent phosphorus and 3.40 to 3.85 per cent carbon.

We have obtained iron from these mixtures having a transverse strength, as determined by a 1¼-in. round bar, of 4500 lb. per sq. in. The average strength of this iron is from 3100 to 3700 lb. per sq. in. Photomicrographs, Figs. 1, 2, 3 and 4, show the structure, etched and unetched, of two bars, which are about an average, having transverse strengths of 3241 and 3610 lb., and tensile strengths of 33,240 and 35,792 lb. per sq. in., respectively. The analyses of these are given as Nos. 2 and 3 of the table.

Castings from these mixtures will regularly show from 35 to 100 per cent greater strength than castings from our regular mixture, which I believe to be up to the standard as used for this general class of work the country over. Besides possessing greater strength, such castings will take a high polish and will give 100 per cent greater service, as compared to ordinary soft gray iron when subjected to hard usage such as slide valves, packing rings and cylinder bushings on super-heated engines, etc.

SPECIAL LIGHT CASTINGS

Special light castings include light pipe fittings which require high strength and great density, thin sections which are subjected to high temperatures and cutting flames (under this class would also come automobile cylinders and parts), metal patterns and light machinery parts requiring an extra high finish.

Scrap steel, 30 to 40 per cent, is used for this class of castings, the other components being a small percentage of good machinery scrap and the balance high silicon pig iron. Test bars from this mixture usually show from 2900 to 3200 lb. transverse strength with proportionately higher tensile strength than the transverse would indicate. Photomicrographs, Figs. 5 and 6, show the structure of a test bar with a transverse strength of 2951 lb. per sq. in. The analysis of this is given as No. 4 of the table.

CARWHEEL CHILLERS

These are regularly made from the mixtures given under special locomotive castings, and comparative service tests have shown that when made from this special iron, they give more than double the service of those made from the regular soft gray-iron mixture; they will produce twice as many wheels before being removed from service on account of fire cracks.

The relative durability of chillers made from the two mixtures is illustrated by the photographs, Figs. 7 and 8. These show the chilling surfaces of two chillers after producing 179 and 186 wheels respectively. On comparing the photographs of the two it will be noticed that the chiller

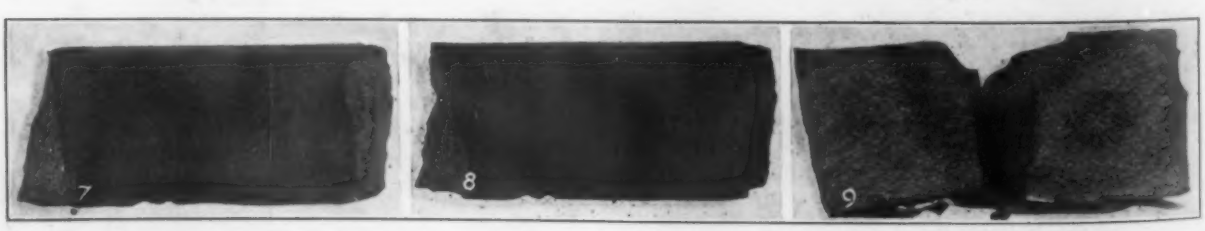


Fig. 7 is the Photograph of the Surface of an Ordinary Carwheel Chiller After Being Used 179 Times. Fire cracks are very noticeable on the surface.

Fig. 8 is a Photograph of the Surface of a Semi-Steel Carwheel Chiller After Being Used 186 Times. Fire cracks are scarcely noticeable.

Fig. 9 is a Photograph of the Fractures of the Ordinary and Semi-Steel Chillers; semi-steel on the left-hand side, gray iron on the right. Notice the uniform fracture of the semi-steel.

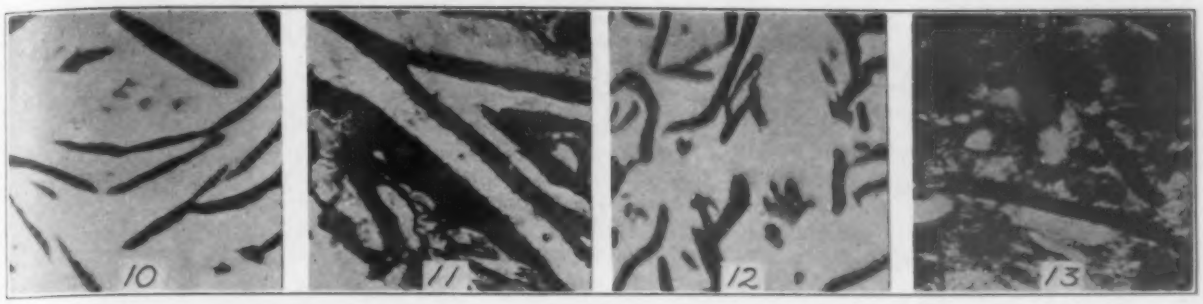


Fig. 10 is the Photomicrograph (100 dia., unetched) of a Specimen from the Center of the Ordinary Carwheel Chiller, Fig. 7. The tensile strength of the test specimen from the center of the casting was 15,090 lb. per sq. in., and the Brinell hardness was 112. Fig. 11 is the same at 150 diameters and etched with nitric acid. Fig. 12 is the Photomicrograph (100 dia., unetched) of a Specimen from the Center of the Semi-Steel Carwheel Chiller, Fig. 8. The tensile strength of a test piece taken from the center of the casting was 25,210 lb. per sq. in., and the Brinell hardness was 159. Fig. 13 is the same at 150 diameters and etched with nitric acid.

represented by Fig. 7, which was made from the regular soft gray-iron mixture, is very badly fire cracked, necessitating its removal from service, while that represented by Fig. 8 is only very slightly checked even though it had produced seven more wheels than the former, this under identical conditions.

The fractures of the two chillers are shown in the photograph, Fig. 9, the gray iron on the right-hand side. It will be noticed that the grain of the semi-steel chiller is much closer and more uniform than the ordinary chiller, which fact accounts, at least in part, for its greater length of service.

Photomicrographs, Figs. 10 and 11 and Figs. 12 and 13, show the structure of the gray-iron and semi-steel chillers respectively, each at 100 magnifications unetched and 150 magnifications etched with picric acid. These were made from polished surfaces of tensile test pieces taken from the center of the chillers, and which showed a tensile strength of 15,090 and 25,210 lb. per sq. in. and Brinell hardness of 112 and 156 respectively. The chemical analyses of these are given as Nos. 5 and 6 of the table.

Until some three years ago, when we began experimenting with special chiller mixtures, the writer was of the opinion that the softer the chiller the more adapted it would be to the service conditions, that of periodical expansion and contraction. This theory was soon exploded by practical tests, which indicated that not the hardness nor the chemical analysis, but more particularly the *metallurgical structure*, especially the arrangement or rather the underlying causes of the particular arrangement of the graphitic particles, influence the resistance of the metal to sudden expansion and contraction. For instance, comparing the two photomicrographs, Figs. 10 and 12, the graphitic particles, represented by the black areas in Fig. 10, are in straight and more or less parallel lines or a laminated arrangement, while in Fig. 12 they are irregular in size and shape, diverging from and intersecting each—an orientated arrangement. Assuming that the graphite sheets form cleavage planes, which is very plausible, it is easy to understand that an iron of the latter structure is superior for this class of service, including not only chillers but grate bars and other castings which are subjected to similar conditions.

While I have laid particular stress on the arrangement of the graphitic particles, since it can be more readily seen by the layman, yet this is only a minor factor in the relative values of the two irons—the greater lying in the metallurgical structure or condition of the eutectic which forms the body or ground mass of the iron, as shown by the grayish areas in the photomicrographs of the etched specimens, Figs. 11 and 13.

While we have been using the special chillers for some time, accurate data has only been kept for 210 working days, during which time about 10 per cent of the chillers made from the regular soft mixture have been replaced, and the present condition of those remaining in service indicates that they will not last more than from 10 to 60 more working days. During this time none of the chillers from the special mixture has been replaced and their present condition indicates that they will last from 1 to 250 more working days or longer—that is, we have reduced our chiller costs by more than 50 per cent. Experience has proved beyond question that similar reductions can be made in other lines, especially in locomotive parts, when the proper care and study is given to the production and use of the most suitable irons for specific purposes.

SEMI-STEEL AND GRAY-IRON TESTS COMPARED

In order to determine the effects of the addition of steel on the strength and properties of test bars cast from irons of like analysis, we have, from time to time, run test heats of semi-steel and gray-iron mixtures, figuring the charges so that approximately the same chemical analysis would be obtained in both cases. These were run as a part of our regular heat, melting the steel mixture on the first part and the gray mixture on the last part of the heat, and vice versa, casting test bars from each and pouring the remainder of the iron in such of our regular days' castings as might be adaptable to the use of the particular grade of iron.

After some experimenting we were able to produce irons of approximately the same chemical analysis, excepting probably the total carbon, from two widely different mixtures, during the same heat. Photomicrographs, Figs. 14 and 15, show the structure of two test bars, of approximately the same chemical analysis as shown by analyses 7 and 8 of the table, which were cast from different parts

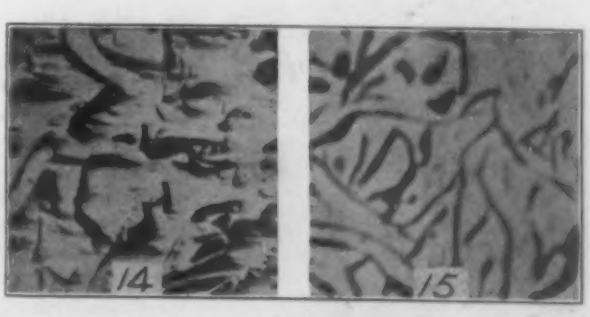
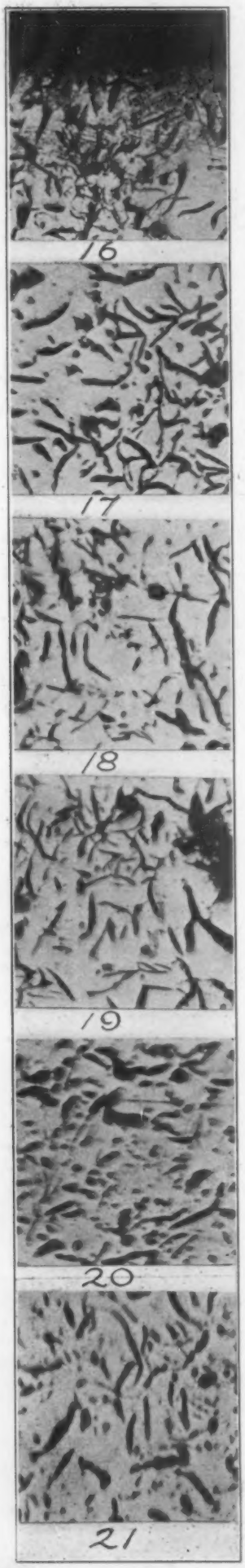


Fig. 14 is a Photomicrograph (100 dia., unetched) of a Specimen of Semi-Steel 1¼-in. Round Test Bar Having a Transverse Strength of 3168 lb. per sq. in., and a Tensile Strength of 27,392 lb. per sq. in., with a Brinell Hardness of 202. Fig. 14 is the same. Fig. 15 is a Photomicrograph (100 dia., unetched) of a Specimen of a Gray Iron 1¼-in. Round Test Bar Having a Transverse Strength of 2557 lb. per sq. in., and a Tensile Strength of 16,958 lb. per sq. in., with a Brinell Hardness of 166.



Figs. 16 to 21.—Photomicrographs of Sections of a Semi-Steel Test Bar

of the same heat, but from widely different mixtures. Fig. 14 is from a 35 per cent steel mixture, the other components being 15 per cent machinery scrap and 50 per cent pig; Fig. 15 is from a mixture composed of 40 per cent machinery scrap and 60 per cent pig iron.

Comparing the tensile and transverse strength of the two bars, as shown in the table, it will be seen than the semi-steel iron shows an increase of 61.4 per cent tensile and 23.9 per cent transverse strength over the gray iron. While the hardness as shown by the Brinell test is slightly greater in the case of the semi-steel, yet the difference in the "toolability" of either was not very appreciable, both being machined at 48 ft. per min. without injury to the cutting tool. As would be surmised from the structure, the semi-steel took a considerably higher polish than the gray iron.

USEFUL CHARACTERISTICS OF SEMI-STEEL

Other characteristics of semi-steel which add to its usefulness are, first, its uniformity of structure throughout the whole section of a casting, whether light or heavy, from the extreme edge to the center or between light and heavy sections, and second, freedom from paper chills. The latter is especially noticeable in light sections and is of very great importance in making metal patterns where the finishing is mostly done with hand files.

The relative uniformity of structure of semi-steel and gray-iron test bars, of like chemical analysis as shown by analyses 9 and 10 of the table, is very clearly illustrated in photomicrographs, Figs. 16 to 21 and Figs. 22 to 27; in which Fig. 16 represents the structure at the extreme edge, Fig. 17 at 2.5 mm. below, and Fig. 18 at 5.0 mm. and so on to the center of a 1-in. square test bar cast from a semi-steel mixture; and Fig. 22, Fig. 23 and so on, the same of a 1-in. square test bar, of practically identical chemical analysis, cast from gray-iron mixture.

Comparing the photomicrographs, it will be noticed that the graphitic particles at the extreme edge of the gray iron bar are very much smaller than on the interior and that they gradually increase in size as the middle of the section is reached and that this same condition does not appear to exist in the semi-steel bar. This same condition was very noticeable in the fractures of the two carwheel chillers shown by Fig. 9, though it is not very clear in the photograph. It will be noticed in the table that the Brinell hardness of the two bars, Nos. 9 and 10, is 192 and 166 taken at the center of the bars, whereas the same on the surface was 199 and 184, indicating that the difference between the hardness of the surface and centers of the semi-steel is much less than with the gray iron bars. This same condition appeared to exist in the case of the two chillers.

DIFFICULTIES EXPERIENCED IN PRODUCING SEMI-STEEL

Semi-steel is nothing more than a particular grade or class of the family of cast irons and like stove-plate, carwheel and malleable iron or other classes, possesses certain characteristic properties which must need be considered in the manufacture thereof in order to obtain the best results.

Correct cupola practice is very essential to the successful production of semi-steel. This is equally important in melting other mixtures, but the results may not always be so clearly evidenced as with this, though equally important. There is no specific formula by which to melt semi-steel any more than there is for other classes of castings.

Figs. 22 to 27.—Photomicrographs of Sections of a Gray-Iron Test Bar

Table of Analyses and Physical Tests of Various Mixtures Containing Steel Scrap

Number	Class	Total Carbon, Per Cent	Graphitic Carbon,* Per Cent	Combined Carbon,** Per Cent	Silicon, Per Cent	Manganese, Per Cent	Phosphorus, Per Cent	Sulphur, Per Cent	Transverse Strength, Lb.†	Deflection in 1/100 In.	Tensile Strength, Lb. Per Sq. In.††	Brinell Hardness†††
1	Locomotive packing ring...	3.49	2.85	0.64	1.14	0.51	0.27	0.090	4,430	0.150	.....	...
2	Cylinder bushing	3.55	2.99	0.56	1.32	0.62	0.30	0.081	3,241	0.165	33,240	179
3	Large gear wheel.....	3.42	2.91	0.61	1.46	0.49	0.48	0.102	3,610	0.154	34,792	188
4	Oil burners	3.21	2.57	0.64	2.32	0.82	0.30	0.068	2,950	0.140	.....	202
5	Carwheel chiller, gray iron.	3.36	2.95	0.41	2.14	0.48	0.96	0.097	....	....	15,090	112
6	Carwheel chiller, semi-steel.	3.63	2.83	0.80	1.31	0.48	0.34	0.088	....	....	25,210	146
7	Semi-steel test bar.....	3.38	2.77	0.81	1.72	0.82	0.38	0.069	3,168	0.130	27,392	202
8	Gray-iron test bar.....	3.75	3.00	0.75	1.66	0.76	0.39	0.071	2,557	0.126	16,958	166
9	Semi-steel test bar.....	3.81	3.14	0.87	1.86	0.86	0.43	0.074	3,175	0.120	.....	192
10	Gray-iron test bar.....	3.78	3.00	0.78	1.85	0.80	0.50	0.060	2,385	0.128	.....	166

1. Sample from 1¼-in. round test bar, cast on end in green sand mold.
2. Sample from 1¼-in. round test bar, cast on end in green sand mold.
3. Sample from 1¼-in. round test bar, cast on end in green sand mold.
4. Sample from 1¼-in. round test bar, cast on end in green sand mold.
5. Sample from center of chiller.
6. Sample from center of chiller.
7. Sample from 1¼-in. round test bar, cast on end in green sand mold.
8. Sample from 1¼-in. round test bar, cast on end in green sand mold.
9. Sample from center of 1-in. square test bar, cast on end in green sand mold.
10. Sample from center of 1-in. square test bar, cast on end in green sand mold.

*Graphitic carbon determined by difference.
**Combined carbon determined by color method.
†Transverse strength in lb. per square inch, bars broken with 12-in. between supports.
††Tensile strength, lb. per square inch.
†††Brinell hardness, 10-mm. ball, 3000 kg.

This must be worked out by each foundryman to suit his particular conditions if the best results are to be obtained. However, as a general rule, smaller cupola charges and greater total tuyere area than are now commonly used are very essential. We have found a charge of 150 lb. of metal per square foot of cupola area and a tuyere ratio of 1 to 5 to give very satisfactory results both in a 32-in., 48-in. and 84-in. cupola. This size charge maintains the melting zone at a fairly uniform height and the large tuyere area admits of a large volume of air at a low pressure, both of which are essential to good melting practice.

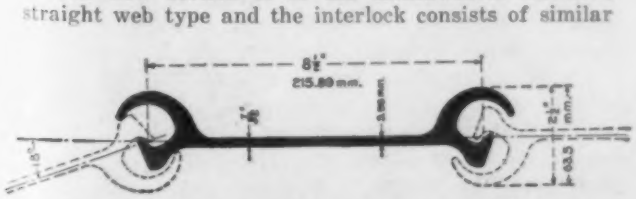
CAUSES OF SEMI-STEEL FAILURES

The greater per cent of failures in the production of semi-steel have resulted from two causes: The lack of proper attention to the cupola and not adjusting the composition (silicon, phosphorus and manganese) and pouring temperature to suit the job. When these factors are given proper consideration, it is no more difficult to use mixtures carrying from 35 to 45 per cent steel than ordinary gray-iron mixtures, either for very light or very heavy castings, and I am safe in saying that it most often happens that the percentage of bad castings is reduced by the use of steel-bearing mixtures. Further, experience has proven that when the proper attention is given to the composition of the metal, to the preparation of the mold and to the pouring temperature that a uniformly stronger casting can be obtained between the light and heavy sections than with ordinary gray iron.

New Straight Web Steel Piling Section

The Lackawanna Steel Company, Lackawanna, N. Y., has brought out a new 8½-in. section of straight web steel sheet piling. It is designed to give a wider range of selection to piling users, and in developing the section special attention was given to the securing of a strong joint and the production of a pile that would have a comparatively low weight.

The new section is of the Lackawanna standard straight web type and the interlock consists of similar hooks and guards on both edges, the same as in the arch web piling, which was illustrated in THE IRON AGE, Oct. 1, 1914. The joint between adjacent piles is flexible through an arc of 18 deg. on each side of the center plane of the piling section. The engagement of the hooks on adjacent sections is relied upon to offer resistance to longitudinal displacement, while the guards overlap and engage the outer surfaces of the hooks on the adjacent sections, an arrangement which tends to prevent lateral displacement and co-operates with the hooks to prevent longitudinal displacement. The joint can be disengaged only by withdrawing one pile. There are three lines of contact between the interlocked members of each joint, which it is pointed out gives a positive, double, firm and close interlock without introducing excess friction in driving or withdrawing and affords an opportunity for the displaced material to work into the joint and assist in rendering it water tight.



A New 8½-In. Section of Straight Web Sheet Steel Piling Having a Flexible Interlocked Joint Between Adjacent Piles

Progress Toward a Uniform Boiler Law

Considerable progress has been made in getting legislation in the different States of the Union based on the American Society of Mechanical Engineers' steam boiler code. The latest report of the American Uniform Boiler Law Society, through Thomas E. Durban, general manager, Erie City Iron Works, Erie, Pa., chairman of the administrative council of the society, is in substance as follows:

The Bewley bill in New York, which was passed unanimously by the House and Senate, was vetoed by Governor Whitman. The reason given was that the legislation was unnecessary, as the Industrial Board stated to the Governor that it had full authority and would adopt the code for the State if given an opportunity to do so. Mr. Durban regarded this as much more desirable than having the code adopted by the Legislature, from the fact that when it is in the hands of the Industrial Commission any changes or corrections in the code can be put in operation in the State without again referring the matter to the Legislature.

A bill has been drawn and will be introduced in the legislature of Louisiana before adjournment, which takes place on July 6, authorizing the Governor to appoint a committee to draw up rules relative to the construction of steam boilers.

A bill will be presented to the Michigan Legislature at the next session.

Hill, Clarke & Co., Inc., in addition to its warerooms at 136 Cedar Street, New York, is now occupying a suite of offices on the tenth floor of the same building. The company has been doing an extensive export business since the war started, and the noise made in crating machines for foreign shipment proved too much for the office force. The change affords not only more comfortable offices, but makes more room for display purposes.

Oil Versus Water for Quenching Forgings*

Characteristic Physical Properties of Carbon Steel Locomotive Axles So Treated—Elastic Limit Higher from Water Cooling

BY C. D. YOUNG

THIS investigation was made in order to show the difference between the physical properties of a large forging quenched in water and those of a similar forging quenched in oil.

The results obtained indicate that there is an advantage in the use of water as a quenching medium, as might be expected from its physical properties. Results obtained at a large heat-treating plant, which has turned out thousands of tons of quenched-and-tempered carbon steel, indicated that no disastrous effects on the forgings are to be anticipated from the use of water as a quenching medium, providing proper care is taken in the handling of the steel throughout the process.

The forgings used for this experiment consisted of two 10-in. locomotive driving axles having a center bore 2 in. in diameter extending the entire length. Both axles were from the same melt of steel, and preliminary chemical analysis indicated the same chemical composition. One axle was treated at the Juniata shops of the Pennsylvania Railroad by water quenching, and the other axle by a steel company which makes a practice of oil quenching.

Water Quenched.—The axle marked *W* was heated to 1550 deg. Fahr. (843 deg. C.), and at that temperature quenched in water at about 60 deg. Fahr. (15 deg. C.). Then, in a furnace maintained at 1175 deg. Fahr. (635 deg. C.), it was heated to that temperature and cooled therefrom in the air on a dry ground floor. That is, this axle, after being quenched from 1550 deg. Fahr. in water at about 60 deg. Fahr., was "drawn" to a temperature of 1175 deg. Fahr.

Oil Quenched.—Similarly, the axle marked *O* was quenched in a heavy oil from the same temperature (1550 deg. Fahr.) and drawn in a furnace to 1200 deg. Fahr. (650 deg. C.), the cooling being done in the air the same as for the water-quenched axle.

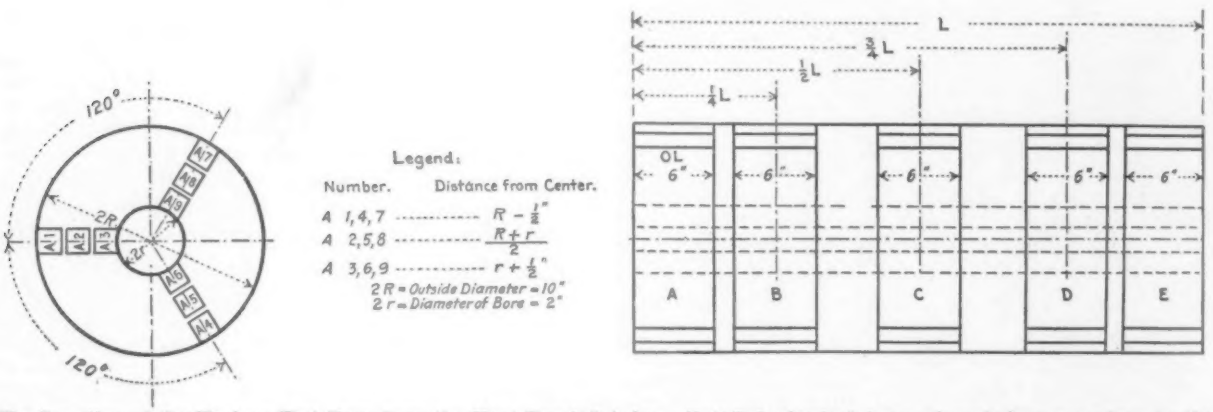
The object aimed at in the above treatment was to have the tension tests on both axles show an elongation in 2 in. of about 22 per cent.

After treatment, the axles were laid off for cutting up into tension test specimens as shown in the illustration. It will be noted in effect that out of each axle there were cut—axially and for the full length, 120 deg. apart—three radial and straight slabs of the overall thickness of a test specimen, and out of each slab five 6-in. lengths, each identified as to its original location in the axle, whether cut from the end and from which end, or whether from the center, or from midway between center and end, and from which slab; and then each 6-in. length was cut lengthwise into three specimens and their location further identified as to whether cut from the inner or outer circumference or from the middle of the wall.

As shown in the illustration, the identification marks for the five 6-in. lengths, in order from one end, are respectively *A*, *B*, *C*, *D* and *E*. It is also shown that the specimens from length *A*, for example, are numbered radially from the outside of the axle toward the axis, the three specimens from the first slab being numbered, as described, 1, 2, 3 throughout; second slab 4, 5, 6; third slab, 7, 8, 9, respectively. The specimens from lengths *B*, *C*, *D* and *E* also have the same numbering as those of length *A*.

The letter *W* applies only to the water-quenched axle and *O* only to the oil-quenched. For example, the markings *WC*2, *WC*5, and *WC*8 each apply to a different slab, but all refer to specimens cut from the water-quenched axle, from its central 6-in. length, and from the middle of the wall. The corresponding specimens for the oil-quenched axle are *OC*2, *OC*5 and *OC*8. Altogether there were 45 specimens per axle, 15 specimens from the three longitudinal planes through the axle, and 9 specimens from all three slabs from each of the five 6-in. lengths.

The test specimens were the standard 2-in. gage length, ½ in. in diameter. The elastic limit was determined by means of a strain gage. All tests were conducted on the same 100,000-lb. tension testing machine using a machine speed of ⅛ in. per



The Location of the Various Test Bars from the Heat-Treated Axles. Detailed physical tests of each bar are given in the original paper

*From a paper presented at the annual meeting of the American Society for Testing Materials at Atlantic City, June 28, 1916. The author is engineer of tests of the Pennsylvania Railroad.

minute for the elastic limit and tensile strength.

Results of the tension tests in which comparison is made with respect to the distance of the test specimens from the axis of the axle, and in which comparison is made with respect to the location of the test specimens along the length of the axle are summarized in Table 1, in which it is shown that the average results are more nearly uniform with respect to the length of the axle than with respect to distance from the axis. This is probably due to segregation, as it was found by chemical analysis that the carbon content was not uniform throughout the section. Segregation is perhaps to be expected in the ordinary output of commercial forgings, but not to the extent found here.

Table 1—Summary of Results of Tests

Location from End	Specimen Marks		Elastic Limit, lb. per sq. in.		Tensile Strength, lb. per sq. in.		Elongation in 2 in., per cent		Reduction of Area, per cent	
	Water Quenched	Oil Quenched	Water Quenched	Oil Quenched	Water Quenched	Oil Quenched	Water Quenched	Oil Quenched	Water Quenched	Oil Quenched
OL	*WA*	*OA*	54,857	51,250	97,111	97,650	22.1	23.2	39.9	41.9
L/4	*WB*	*OB*	52,634	52,160	96,637	97,304	22.8	25.2	40.3	45.7
L/2	*WC*	*OC*	55,626	51,230	96,472	96,880	23.7	25.1	44.0	46.8
3L/4	*WD*	*OD*	56,064	51,170	96,470	96,030	23.1	23.5	42.5	40.7
L	*WE*	*OE*	53,376	49,780	95,720	94,210	23.6	24.0	44.3	41.7
Aver.....	....	.....	54,509	51,118	96,482	96,415	23.1	24.2	42.2	43.4
Location from Center										
Axis										
$R-\frac{1}{2}$ in.	*W* 1, 4, 7	*O* 1, 4, 7	55,216	51,423	94,187	93,719	25.6	26.0	52.7	49.7
$\frac{R+r}{2}$	*W* 2, 5, 8	*O* 2, 5, 8	51,064	48,390	95,508	92,572	24.4	25.5	44.5	45.8
$r+\frac{1}{2}$ in.	*W* 3, 6, 9	*O* 3, 6, 9	57,255	53,543	99,751	102,962	19.2	21.2	29.7	34.5
$\frac{R+r}{2}$	Minimum permitted by A. S. T. M. Specifications		50,000		80,000		20.0		40.0	

A comparison of the average physical properties of all test specimens from both axles (Table 1) shows that with an elongation 4.5 per cent less than that of the oil-quenched axle, resulting from the difference in treatment, the water-quenched axle gave an elastic limit 6.6 per cent greater, about the same tensile strength and nearly the same reduction of area.

This table gives the average results from all test specimens located equidistant from the axis in each axle. The average results from the outer test specimens at the location $R-\frac{1}{2}$ in. show the water-quenched axle to have about the same elongation as the oil-quenched axle, 7 per cent greater elastic limit, 5 per cent greater tensile strength and 6 per cent greater reduction of area.

The test specimens from the middle of the wall show lower elastic limit and tensile strength than either the outer or inner test specimens, except that the strength of the water-quenched axle at the middle of the wall was found to be somewhat higher than in the outer specimens. It is evident that this mid-region of the section was less affected by the heat treatment. The water-quenched axle, however, shows higher elastic limit and tensile strength in this region than the oil-quenched axle, although, as already stated, the average strength of the entire section came out very closely the same for both.

The results obtained from test specimens from the inner surface of the wall are not so consistent; that is, they show a higher elastic limit and a lower tensile strength, elongation and reduction of area for the water-quenched axle.

All of the forgings tested meet the requirements of the specifications of the Society, except that the elastic limit found in the middle of the wall in the oil-quenched axle is somewhat low.

Photomicrographs taken from test specimens *WE*6 and *WD*3 on the water-quenched axle do not afford any apparent explanation for the difference in physical properties, but in both cases indicate that the water quenching was effective in securing a good diffusion of the carbon throughout the structure, leaving only a small amount of ferrite network. The carbon content in these two specimens was about the same, slightly over 0.60 per cent.

The same is true of photomicrographs taken from test specimens *OE*4 and *OD*9 of the oil-quenched axle, the latter having shown higher elastic limit and tensile strength, with lower elongation, no explanation being apparent from the microstructure, except that specimen *OE*4 indicates a lower carbon content, which was confirmed by chemical analysis. The carbon content in specimens *OE*4 and *OD*9 was 0.52 and 0.62, respectively. The structure of the oil-quenched axle shows a fine network, which is absent from the water-quenched structure, although characteristic of carbon steel treated by the oil-quenching method.

Table 2 gives the chemical analysis of representative test specimens taken from each axle.

The water-quenched axle samples, taken from the *A* end show that the outside and midway specimens *WA*4 and *WA*5 have the same carbon content, but when compared with analysis from specimen *WA*6 of the inner wall there appears a segregation of 15 per cent. The same is true of the samples taken from the opposite end of this axle.

In the oil-quenched axle also, the same segregated condition is present, the outer and middle test specimens having about the same carbon content, while the specimens *OA*6 and *OE*6 taken close to the inner surface, show a segregation of 14.5 and 11 per cent, respectively, when compared with the corresponding samples taken from the middle of the wall.

Table 2—Chemical Composition of Specimens

Specimen Marks	Carbon, per Cent	Manganese, per Cent	Phosphorus, per Cent	Sulphur, per Cent	Silicon, per Cent
WA 4	0.53	0.56	0.019	0.031	0.159
WA 5	0.53	0.56	0.018	0.030	.....
WA 6	0.61	0.58	0.019	0.039	0.158
WE 4	0.53	0.56	0.019	0.030	0.162
WE 5	0.53	0.56	0.019	0.032	.....
WE 6	0.61	0.57	0.025	0.040	0.299
WD 3	0.62	0.57	0.023	0.042	0.176
OA 4	0.55	0.56	0.018	0.030	.....
OA 5	0.55	0.57	0.018	0.033	0.190
OA 6	0.63	0.59	0.019	0.041	0.195
OE 4	0.52	0.55	0.021	0.036	0.167
OE 5	0.54	0.56	0.019	0.031	0.182
OE 6	0.60	0.59	0.019	0.038	.....
OD 9	0.62	0.57	0.020	0.044	0.176

WA is water quenched; *OA* is oil quenched.

The segregation found in both of these axles indicates a condition which increases the difficulty of securing a satisfactory treatment of the forgings, and points to the desirability of including in all specifications for forgings which are to be heat treated, a clause to govern the allowable amount of segregation; otherwise it may be expected that extreme segregation will be found, as in the forgings here discussed.

The W. P. Snyder, Jr., of the Shenango Steamship Company's fleet, unloaded a cargo of 12,746 gross tons of ore at Ashtabula, Ohio, a few days ago, which is said to be the largest cargo of ore ever shipped to a Lake Erie port.

Selling Machinery and Steel in Russia

Common Sense and Thoroughness versus Hysteria and Superficiality — Practical Points for Those Who Seek Russian Buyers

BY ARCHIBALD J. WOLFE*

When some yet unborn historian will undertake, in the dim future, to write the history of the American export trade, he may, in perfect good faith, inform his readers that our foreign commerce was discovered around 1906 by several enterprising illustrated popular weeklies. Sunday papers took up the promotion of our exports only a year or two later, when the importance of foreign trade as a news feature became thoroughly well established.

Of course, export trade at that time meant selling to Cuba and perhaps Brazil and Argentina. But the tremendous upheaval of the world war has brought out, as through some volcanic eruption, a new export market, and now theorists of the press and the platform talk, dream, argue, sell and advertise Russia. Yes, Russia has just been discovered by a vast tribe of persons who had never sold a package of pins to a foreign customer, and almost every person whose surname ends in "ski" or "vitch," or whose affiliations with the Russian empire and qualifications for either selling there or advising on selling in Russia may be of the very flimsiest description, is promoting Russian trade. And the flimsier such qualifications are, provided a glib tongue and a convincing readiness to promise the blue from the sky is not missing therefrom, the harder the manufacturers and exporters fall for it, and the greater the faker, the more densely thronged his anteroom by manufacturers heaping into his receptive palm subscriptions, contributions and contracts for representation in Russia.

Hysteria and superficiality have frequently distinguished American efforts in the exploitation of new markets. Common sense and thoroughness, however, are the qualifications of those American manufacturers who make a permanent success in these markets.

AMERICAN MANUFACTURER SHOULD KEEP COOL

The present boom of American interest in Russian trade has one or two features of similarity with the early effervescence of our trade with Latin-America. Every boat from Europe brings over a crowd of more or less representative Russians; organizations dealing with Russian trade are springing up everywhere; journals devoted to Russian-American trade development send around dummy advertising forms before ever dreaming of securing a circulation; exiles and the children of exiles suddenly discover the marketableness of their descent and country of origin, of which many of them were as little proud as their country of origin was of them. The Russian boom, as the Latin-American boom, has called into life, almost overnight, a great variety of promoters, fakers, dreamers, schemers and hangers-on.

It behooves the American manufacturer to keep cool in the face of all this superficial bubbling and to examine the situation for himself in all calmness and seriousness. One basic fact, not requiring the indorsement of the spurious trade evangelists referred to, is that Russia is indeed a big market for American products, and one that has been neglected by American manufacturers, perhaps a little more than German competition and Russia's need of credit facilities have warranted, but certainly a market which it is unsafe to rush into head-over-heels, misguided by unqualified and irresponsible adventurers.

The American manufacturer desiring Russian business will have, first of all, to decide in his own mind whether the profitable flood of war business is all that appeals to him, or an after-the-war trade that must be built up systematically, thoroughly, solidly and patiently. If he has something to offer that Russia can use in the carrying on of her tremendous struggle with the Teutonic powers, he will find no difficulty in disposing of his products either to the Russian Government direct, which has a very live and keen purchasing organization, or to contractors dealing with the Russian Government. This business, profitable as it is, will necessarily come to a close with the end of the war, or perhaps linger until Russia has replenished her stores of war material for reserve purposes, after her inevitable victory.

If the American manufacturer, however, figures on getting the share of that business which Germany at one time enjoyed there, or of selling direct those American goods which used to reach Russia through German channels, it will be a very wise thing for him to study for himself the means of marketing his products in Russia rather than either delivering himself, body and soul, to some one of the enterprising great organizations which have come on top, due to farsightedness and energy displayed in the early part of the present war, or to tie up with any one of the vast array of fakers and schemers claiming that they can do wonders in Russia.

ORGANIZATION THE FIRST REQUISITE

Organization is the first and foremost need of the American manufacturer seeking Russian trade. This organization requires a study of Russian market conditions. It is probably either lack of time or an unconquerable laziness and a desire to shift responsibilities on the shoulders of anyone expressing a willingness to bear them, for a consideration, that causes the American manufacturer to fall in with the first likely selling scheme that is offered him. It may be troublesome to go to Russia and study conditions there, but it is worth while, although it may seem easier to pay several hundred or several thousand dollars to somebody else who will promise to build up a market for his goods in Russia.

Next to the study of Russian market conditions in organizing an American manufacturer's business in Russia, there is a need of men capable of guiding such an organization. In this connection, it is a sad fact that there are very many who claim that they can fill the bill and very few persons who can answer the requirements.

It is not only necessary that a man shall speak or write the Russian language to engage him as the Russian manager of a manufacturer and trust that he will deliver the goods. There are slightly over 150,000,000 persons in Russia who speak the language of that empire, but there is hardly one man in a million who could do justice to an American organization marketing American products there. It is much safer, and much more sensible, to pick an American who knows his line, who has executive and selling ability, and send him to Russia to learn as much of the language and conditions there as he can. It is really a grave mistake to attach more importance to a knowledge of the language than to American personality, executive ability and selling genius.

The present article, while applicable practically to every American product, is primarily intended for consideration by American manufacturers of machinery and allied lines.

GERMAN COMPETITION FORMIDABLE HITHERTO

Hitherto German competition has been a very formidable obstacle in the way of the promotion of Amer-

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ican machinery sales in Russia, and yet an obstacle which many firms have overcome more or less successfully through the superiority of the American product. Everyone will call to mind the activities of the International Harvester Company, an organization which had brains enough to study the Russian market thoroughly and adapt its selling methods to the peculiar conditions discovered there. Another example which every account of American progress in Russia will bring out is that of the Singer Sewing Machine Company, and yet this enterprise almost suffered shipwreck in Russia during the war, with numerous branches closed down, because it committed the foolish mistake of having a large number of German subjects manage its branches in the Russian empire. An important point on the subject of Russian sales that an American manufacturer of machinery will have to settle for himself is what effect the present determination of the Russian people not to deal in Germany will have upon actual facts in the future. As one who has lived in Russia during the past few years, I may state that I am positively convinced of the sincerity of the Russian people in their refusal to deal with the Germans. I am convinced that Russia will win out in the present war. If she does, there will doubtless be a heavy tariff on German goods entering Russia. To what extent German proximity, the speed with which the Germans will be able to deliver goods, the readiness with which they will meet Russia's need of credit and the concessions which Germany will make in every possible direction will be able to overcome the Russian determination not to buy from Germany and the Russian tariff schedules remains to be awaited. I, for one, am not optimist enough to believe that the ultimate appeal of the dollar will fall on deaf ears. German competition, even in the event of Russian victory, is bound to become a factor sooner or later. In any event, however, the American manufacturer will have a running start, and it will be his business to use the advantage gained in setting a firm foot on Russian soil.

Here is where the individual effort of the American manufacturer requires the assistance of organized effort on the part of the entire American trade in the improvement of transportation and credit facilities with Russia. There must be found a speedy and dependable method of delivering purchases to the Russian buyer. The closing of the Russian ports in Europe and the necessity of crowding out private orders for an unobstructed transmission of ammunition and other war materials force the Russian buyer now to wait weary months for the arrival of his order; but the time is coming when he will be in a position to demand prompt delivery.

BANKING FACILITIES NEEDED

Irrespective of the outcome of the war, Russian buyers will be compelled to give preference to sources of supply affording certain credit facilities. It is understood that the American manufacturer is not, of himself, in a position to burden his selling organization with the task of financing the customer in addition to other expenses. This phase of the situation will force American manufacturers either to make arrangements with banks or to place their selling in the hands of a strong independent selling organization which enjoys the backing of a bank for the extension of credits in Russia.

This brings up the question of improving our banking facilities in Russia. What is to be done? The idea of a Russian-American bank, at first glance, presents a solution of the problem, but the schemes that have been exploited so far in this connection have not really had a responsible and reliable backing. It is one of the ills of the export trade that some of the best ideas have been propagated by some of the least responsible promoters, placing before the likeliest exporting manufacturer the dilemma of either turning down a good idea or forming an unsatisfactory alliance in promoting it.

One danger of a bank of this description would be, to my mind, its being forced, in its incipient stage, to make individual alliances, giving preference to certain clients. It would be far better if our great banks made arrangements with Russian banks on some mutually satisfactory basis which would give the American manufacturer the sporting chance of competition rather than subjection to the monopoly of some necessarily weak financial institution that would be compelled to cater to individual concerns.

CHANNELS THROUGH WHICH TRADE IS SOUGHT

In taking up business with Russia, the American manufacturer must decide to do business either by himself or through some selling organization. He will recognize the value of all United States Government promotion of American commerce abroad, and thank the Government for its consular reports, for its commercial agents and attachés, and for all the auxiliary services rendered by the Government, but he must be very clear, in his own mind, that in order to build up a large and permanent business in Russia, he cannot largely depend upon governmental activities. He must do his own selling, unless he is satisfied with chance trading opportunities which the Government must impartially present to his competitors as well as to himself. He will use these various official services if he does not know enough about foreign trade to get all this information through his own organization, and a little ahead of his competitors, but he will not depend upon them to any great extent to sell his goods.

The manufacturer will recognize the value of the various chambers of commerce, the active and the passive, and their connections, and probably he has learned long ago to place the value of these activities where it belongs—that is, in the domain of mutual assistance in matters of broad interest, rather than as a source of sales and extension of individual trading.

The manufacturer will realize that the value of journals devoted to export, either general or specifically Russian, is in direct proportion to the circulation of these papers, and that, without disparaging the efforts of these worthy enterprises, the amount of money spent on publicity in their columns could be much more satisfactorily employed in direct circularization. Exception from this statement must be taken with regard to general lines seeking a world-wide publicity, where advertising in a general export paper is not to be despised. But a manufacturer who has a turret lathe or a screw-cutting machine to bring to the notice of the trade in Russia, and wishes to do so by publicity, can to much greater advantage circularize the entire trade direct than depend upon a few copies of some export paper reaching the mark.

Finally, the manufacturer will discount the activities of unreliable persons or aggregations of persons promising him the cream of the Russian trade. He will examine the claims of such organizations very thoroughly. There are some organizations in the field now which can do justice to the products of the concerns affiliated with them, but the number of such organizations is exceedingly small.

If the manufacturer decides to cast in his lot with one of these organizations, he must maintain a continual insight into the selling methods of such an organization. It is not sufficient for him to know that the head of such an enterprise is either related to or acquainted with somebody in the Russian Cabinet or Parliament or the City Council of some big Russian municipality.

During my stay in Petrograd not a day passed that I did not meet people pretending to wield an unusual influence with some important individual. This is very reasonable, for every big man in Russia has friends and every one of his friends has friends of his own; but this is not selling American machinery any more than one can sell machinery in this country because one happens to be a friend of a friend of somebody.

An organization that can do justice to the products of an individual manufacturer will have to show where its branches in Russia will be located, by whom its branches will be managed, and what special attention to the particular line intrusted to it will be given.

Manufacturers must not be blinded by a foreign name, a persuasive line of talk, an elegant suite of offices, in conjunction with the hypnotic influence of the

idea of selling in Russia. Those American manufacturers who almost fought one another for the favor of certain promoters preparing to invade Russian commerce may find comfort in the thought that the competitor who beat them to it may gather more experience but will not sell more goods than the manufacturer who goes after this business independently.

INDEPENDENT SELLING METHODS

If not interested in marketing his products in Russia through an independent selling organization, the American manufacturer of machinery may decide to work the Russian field through his own organization. He will find it advisable to engage, as an assistant to his export manager, a person thoroughly conversant with Russian trade conditions and machinery, but, of course, such persons are much more difficult to find than is ordinarily imagined. If the demand does not exceed the supply the percentage of applicants whose performances are at all commensurate with their professions is, unfortunately, exceedingly small. It is far better for a manufacturer to waste his own export manager's time to the extent of sending him to Russia on a trip of investigation and for the purpose of forming connections there.

As a general proposition, an American manufacturer of a special class of machinery will not find it worth his while to establish his own offices in Russia. There are a number of reputable machinery merchants and agents in ePtrograd, Moscow and Odessa, with correspondents and connections in other industrial centers, and satisfactory arrangements can be made with such concerns for the representation of American manufacturers of machinery. It is necessary, in this connection, to learn the predilections of such a firm, in order to avoid the possibility of its working for the benefit of a German or British competitor. It is also advisable to make a personal investigation of the claims of merchants or agents as to specially good connections and facilities for the handling of the particular product.

Frequently, it will be found feasible for several non-competitive manufacturers to co-ordinate their efforts by having a common representative or an office of their own in Russia. This would not only help minimize expenses but would also be a great convenience to the buyers, who are ant to give preference to a concern from which more than one lien of products may be purchased.

POINTS ADVISABLE TO BE KNOWN

Certain machinery is sold direct to users, not through the trade, and in that case a list of these users may be conveniently procured and circularized from the United States, or through an agent in Petrograd or Moscow, or through a branch office, if it is decided to establish one.

Personal contact in Russia, as well as in other export markets, is a valuable thing. There is no catalogue or circular letter in existence that can stand the competition of a salesman on the spot, prepared either to quote himself or to communicate with his principal by cable.

If it is decided to open a branch office in Russia, the manager of that branch office should know his particular line and the Russian market, but, above all, he should have organizing and selling ability. It is useless to have a man at the head of a branch office in Russia who is not, socially and personally, a presentable person as well as a good salesman. Much of the Russian business is done over a dinner table and in public restaurants. Fortunately, the Russian people like the better American type, although they object to the swaggering salesman making extravagant claims.

In looking for representatives or correspondents in Russia, the American manufacturer must be careful not to be carried away by the title of engineer, which is a very common one in Russia. Russian polytechnic institutions turn out a vast number of theorists, and it is a rare occurrence to find a Russian engineer who has ever had any shop experience. They are not engineers with even a partial experience in overalls, but splendid mathematicians, and, frequently, indifferent business men. The Russian engineer is also, very frequently, an incorrigible optimist, and, in spite of a usually excellent character, he is generally undesirable as a representative without some training in American methods.

GRATUITIES NOT NECESSARY TO DO BUSINESS

With regard to sending representatives to Russia for a study of conditions, they must be warned against several varieties of parasites now infesting Petrograd. The first is the individual who claims that he has mysterious back-stair influence which he will sell for a consideration, and that the particular line of product cannot be sold in Russia without the disbursement of gratuities and graft through that individual. It has been my fortune to do a considerable business in Russia without the disbursing of one cent's worth of graft. Claims to the contrary are a gross exaggeration due to ignorance of the language and conditions.

The next person to beware of is the interpreter, whom a person ignorant in the use of the Russian language must take along in order to make himself understood. I sat dumbfounded in the office of an important official in Russia while the representative of a prominent American company was making certain statements through the medium of an interpreter, who failed to transmit the very point the American was trying to make. This was not done through ignorance of the English language, but simply because the interpreter thought he knew better than the American and was using his judgment, which was not what he had been hired to do. Fortunately, the official in question understood English, although, for reasons of policy, he did not divulge the fact, and when, after the visitors had left, I called his attention to the fact that the interpreter had misinterpreted his principal's remarks, the deputy minister smiled and said, "I knew it all the time."

Ignorance of the Russian language is not a very vital obstacle. The knowledge of English among Russian officials, and particularly among firms selling and handling machinery, is widespread. With a knowledge of English and French, or, after the war, with a knowledge of German (German conversation is now strictly prohibited in Russia), an American manufacturer will make headway.

SELLING MACHINERY SUMMARIZED

As far as selling machinery in Russia is concerned, I may summarize my remarks as follows:

Russia is, indeed, a promising field for American machinery. Certain facilities now lacking must be quickly established by American commerce before the Russian market can be exploited fully for American manufactures, particularly credit and transportation. Neither the highly advertised organizations nor the glib schemers that have sprung up over night, neither mere publicity here and there, nor Government aid, will put an American manufacturer on the map in Russia. He must make a special study for himself, and after a trip to Russia satisfy himself as to whether his particular product may be best handled by a reliable export organization in America having branches in Russia, or by his own branch office, established independently or in conjunction with non-competitive manufacturers, or by granting an agency to already organized Russian enterprises. But, in any event, he must not be blinded by the glamour of a foreign name or optimistic promises, but must exercise, in the selection of the particular type of organization suitable to his product and of the men in charge of such an organization, the same judgment and common sense that he would exercise in the equipment of a branch office in the United States and the appointment of persons for the management of his own various departments. He will then find that there is no magic in achieving success in Russian business, but the very same principles underlying all success in business, namely, common sense, a knowledge of the trade, persevering effort in its cultivation, and publicity suited to his article and to his market.

THE SALE OF IRON AND STEEL PRODUCTS

With regard to iron and steel products proper, a sharp differentiation must be made between selling to Russia during war times and the prospective trade after the conclusion of the war. At the present time, Vladivostok is the only Russian port open for the importation of merchandise for private needs. The other ports are either closed as a result of the war or are totally taken up by the needs of the Russian Government. Almost every variety of iron and steel products can now be sold to the Russian Government, either direct in Petrograd or to the various buyers acting for the Russian Government in this country, or to contractors selling to the Russian Government in Petrograd. Next to the steels used in the manufacture of ammunition, barb wire, rails and wire rope form the principal articles in demand.

After the war, a brisk business in most iron and steel products may be expected with Russia, and the following forms may be well worth considering in connection with that prospective trade: High speed tool steels will be very largely in demand and the competition in that quarter will be small. It will pay to open an agency in Petrograd with branches in Moscow, Russian Poland (if it still should form part of the Russian empire after the close of the war), and one or two points in the interior. Structural steel will be largely furnished by the Russian mills, except for large tonnages, such as may be required in bridge building, where English competition only will be worth considering, as there is every indication that German effort in that quarter will be a negligible factor for some time to come. A permanent business in structural steel, as far as American mills are concerned, may hardly be looked for in Russia, in view of the fact that our prices will be too high to compete with domestic mills and our deliveries not sufficiently satisfactory.

There is a conceivable prospect of sales of plates for elevator construction, and a large business will be done in shipbuilding plates, as the shipbuilding industry will be one of the first to boom in Russia. Here, too, English competition will be most important, local mills being unable to meet the demand and the German competition remaining a negligible factor for at least a few years.

Rails and railroad products, in accordance with Russian specifications, can be freely sold to the Russian Government, but, of course, the congested condition of the American steel mills greatly interferes with this business at the present time. After the war, Russian mills will be capable of meeting the demand, unless the Russian program of extensive railroad construction should be carried out rather more quickly than at present anticipated.

In connection with selling rails and other railroad supplies, it must be remembered that the government is the only buyer capable of purchasing in Russia. There are a number of private railroads in Russia, but, according to Russian laws, they cannot place purchases abroad without the express permission of the Russian Ministry of Railways, and, being forced to pay a heavy duty, the price would be too high for them, even if such permission were granted them. The Russian Railway Ministry will never grant permission to private railroads to buy material abroad as long as the Russian Government itself is in the market for such material, and the congested condition of foreign mills makes it impossible to fill the demands of that government quickly and at low prices. This business may be quite important for a certain time after the conclusion of the war, but eventually, when normal conditions are resumed, there will be no chance for American rail makers in the Russian empire.

Among the wire products, barb wire, of which vast quantities have been sold during the war, will be hardly wanted after the war, unless for the re-equipping of Russian fortresses and the replenishing of reserve supply. Eventually, the small Russian mills will be fully capable of coping with the normal demand. Wire rope, which is now sold largely to the Russian Navy Department, will be badly wanted in large quantities in the Russian oil industry in the Caucasus as well as by the various mines in southern Russia, and there is every prospect of building up a large business in this line in competition with British makers and with the few Russian factories. Only quick deliveries, however, will make it possible to sell our goods in this line in Russia, because our prices are high compared with the Russian product.

Telegraph and telephone wires will be an article of sale to the Russian Government. A large business may be built up in baling wire, both with the Russian Ministry of Agriculture and with the various provincial bodies, as well as with the cotton-growing interests in Turkestan.

With regard to tubular products, seamless tubing, particular of large diameters, will be an article of extensive sale, and it may pay to have well selected agents handle this line. Cast-iron pipe will have no sale, because of Russian competition, and the Russian mills will also turn out seamless tubing in small diameters in sufficient quantities to meet the normal demand at a reasonable price.

There is no prospect of building up a trade in nails, tacks, nail rods nor horseshoes, in spite of several large sales effected during the war, but a horseshoe calk in accordance with Russian specifications will sell readily.

Finally, there is a prospect for fairly good sales of manganese rails and sections for the use of Russian tramways, which are owned in Russia partly by municipalities and partly by Belgian companies.

Tin plate, galvanized sheets and roofing iron may be sold if prices are right and deliveries prompt.

There will be considerable activity among the Russian carbuilding plants and wheels and axles will be wanted in great quantities until normal conditions are resumed.

Summarizing the prospects of American iron and steel products in Russia, it may be said that for a certain period after the conclusion of the war there will be ready demand for practically all classes of these products, but under normal conditions the best prospects are in the following lines: High speed tool steels, wire rope and seamless tubing. Semi-finished products in general will not form a large item of purchase in America.

In taking up Russian business in these lines, it will be found a great advantage to have stocks on hand, and perhaps for this reason, rather than have branch offices of their own in Russia, American producers will find it advisable to form connections with Russian or American firms already on the ground and equipped to handle this business.

Production of Manganese Ore

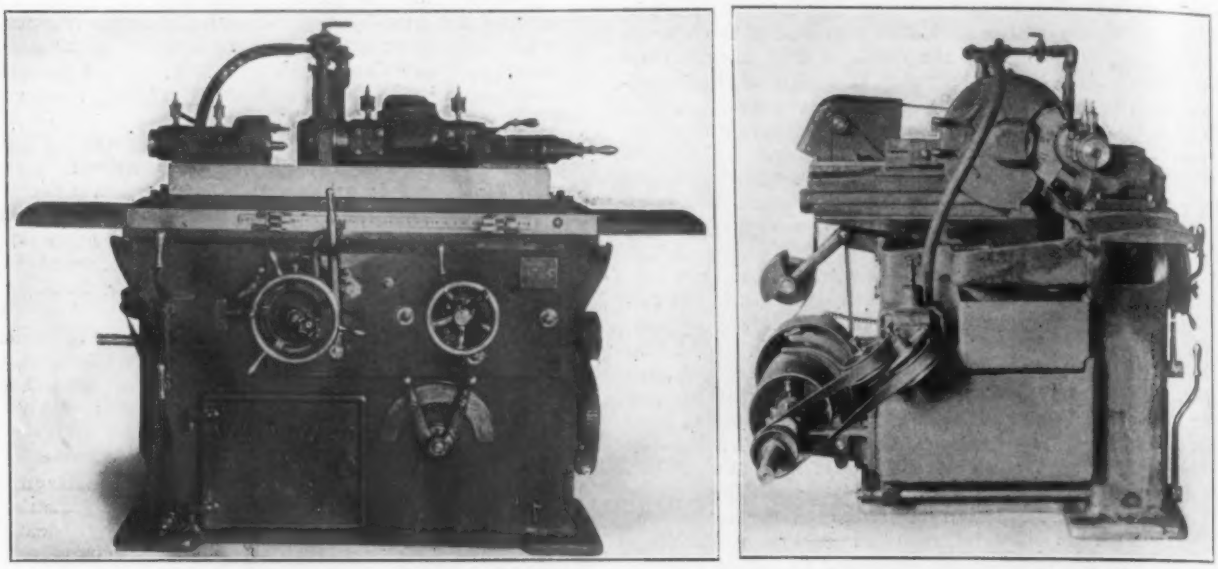
The production of manganese ore in the United States in 1915 was 9651 gross tons, being the largest since 1901 and more than three times the production in 1914, which was 2635 tons. This output was made by thirty-four operators in ten states, of which the four most important, in order of output, were Georgia, California, Virginia and Arkansas, according to figures compiled by the United States Geological Survey.

The production of manganiferous iron and silver ores in 1915 was 798,404 tons, which was almost twice the output in 1914. Most of this ore was used in making high-manganese pig iron, but a large quantity was used as a flux by lead smelters; 66,530 tons contained more than 15 per cent manganese and a large part of this was used to make low-grade ferromanganese.

The prices offered for manganese ore adapted to the manufacture of ferromanganese rose during 1915 to the highest figures that have been recorded for 30 years. In August Eastern alloy makers offered $22.50 a ton for 50 per cent ore, which should be compared with $12.50 per ton, the average price for the preceding five years. In March, 1916, it was reported that $32.50 per ton was paid for such ore. There is good reason for expecting a further increase in domestic production during 1916 as a result of the high prices offered, but it is doubtful whether more than 10 per cent of the domestic demand can be met by domestic production.

Grinding Machine for Cylindrical Work

Two additional sizes, 8 x 18 in. and 8 x 30 in., have been added to the line of self-contained grinding machines built by the Modern Tool Company, Erie, Pa. They are essentially manufacturing machines for the production of straight or taper cylindrical work in quantities. All the operating levers are concentrated on the front of the machine, and nothing extends above the wheel stand.



A Manufacturing Grinding Machine That Has Been Developed for Producing Straight or Taper Cylindrical Work and Has the Table Drive a Single Unit in the Machine Bed

The bed is a one-piece casting, and the various units are located so as to make them readily accessible. Both V and flat guides are used on the sliding and swivel tables and under the wheel stand to keep the parts in alignment. The base rests upon three points, which also tends toward the same end. The wheel stand pile is bolted to the bed and the stand slides on V and flat ways. Gravity is relied upon to keep it in place, but a safety gib is provided to guard against lifting under abnormal conditions. The wheel center has a long bearing on the spindle, and will take any standard wheel 16 in. in diameter with a 3-in. face. The wheel spindle is driven by a 4-in. belt and runs in phosphor bronze bearings 6¼ in. long, having sight feed oilers.

The table slide is heavy and is reinforced by ribbing. It furnishes a large bearing for the swivel table which pivots on a large central stud and provides for taper grinding. The table drive consists of a single unit contained in the bed of the machine, which is a combination of table drive and transmission. The power table traverse is controlled by a lever which provides for starting or stopping the table at any point. When the power traverse is in use the handwheel is automatically disengaged and is re-engaged as soon as the power traverse is released. Four table feeds derived from a single-unit gear box and controlled by a lever are provided, the range being from 20 to 104 in. per minute. The automatic cross feed is positive and can be set for a reduction of any amount from 0.0005 to 0.0050 in. at either or both ends of the table traverse. This feature, it is pointed out, is advantageous when grinding against a shoulder. When the work is ground to size the automatic feed is disengaged. The handwheel controlling the cross feed is graduated from 0.0005 in., and moving a lever adjusts the cross feed to the amount desired as indicated on a graduated dial plate, and the rate can be changed instantly while the machine is in operation. A positive stop is provided for use when feeding by hand.

The headstock is driven from a shaft under the sliding table which is driven by a pulley carried in a bracket on the bed that receives power from the gear box. This shaft is splined for its entire length to enable the ball-driving mechanism contained in the pulley mounted on the bed to be used. This mechanism, which is the same as that employed in the builder's machine, which was illustrated in THE IRON AGE Dec. 31, 1914, drives the shaft and is also relied upon to eliminate friction in the traversing movement. A belt from this shaft running over an idler pulley drives the headstock at rates ranging from 26 to 390 r.p.m. The headstock is fitted to a swivel table by V and flat ways, and is held in position by clamp bolts. The spindle revolves in adjustable bronze bearings for live center work, the faceplate being clamped to the spindle. To change to dead center work, the screw clamping the faceplate to the spindle is loosened and the clamp on the headstock which holds the spindle in the headstock base tightened, after which the dead center pulley is free to revolve upon its bearing.

The footstock is fitted to the swivel table in the same manner as the headstock, and the spindle is held in position by a spring or may be set positively against the work and locked. The work centers on the head and foot stocks are directly over and between the table guides. The wheel truing device is mounted on the footstock and can be adjusted to cover all diameters within the range of the machine, thus enabling the wheel to be trued without removing the work from the centers.

A generously illustrated booklet on National Matheson joint pipe has been issued by the National Tube Company, Pittsburgh, Pa. It is the third edition, revised and enlarged, and is conspicuous for the many reproductions of photographs showing installations made under difficult circumstances. The joint is a bell-and-spigot joint, similar in appearance to a cast-iron joint but applied to National pipe. Considerable emphasis is placed on the strength of the pipe, including its resistance to fracture by impact, and also on its comparative lightness. The pipe lines illustrated include those used for gas lines, water distribution and in mining work.

The Metal Manufacturers' Association of Philadelphia has removed to room 218, Mariners and Merchants' Building, 308 Chestnut Street, Philadelphia, Pa.

Lathe With Special Quick Change Gears

A lathe swinging 16 in. with a 9-ft. bed has been brought out by the Lehmann Machine Company, St. Louis, Mo. The lathe has a link connection to the parts of the half nut to reduce wear, an improved locking device for the tailstock, and a special arrangement of the quick change mechanism.

The bed is cut away at the end to enable the tailstock to overhang or the steady rest to be placed at the extreme end of the bed as well as facilitating the removal of either. All the adjustments of the steady rest and the locking of it except to the bed are accomplished with star handles. It is also possible to reverse the rest on the bed, thus enabling the tool to be run up close from either side.

The headstock casting is carried from front to rear boxes on a line with center of spindle, which it is explained ties the bearing rigidly together and protects the operator against being caught by the belt. A three-step wide face cone pulley and double back gears are provided, this arrangement giving nine spindle speeds in approximately geometrical progression using a single belt running in one direction on the countershaft. The spindle end thrust is taken by fiber in contact with hardened and ground steel washers.

The quick change mechanism employs the familiar cone of gears with a sliding rocker arm which has two central gears of different ratios and an intermediate gear for each. One set of changes is secured by dipping the rocker arm and by raising it the next set is obtained. For very fine or coarse threads and feeds it is necessary to throw another handle to the right or the left to move the rocker arm. A total of 48 changes enables threads from 2 to 112 per inch to be cut and a similar number of feed changes are secured by this arrangement. The additional central gear and idler on the rocker arm, it is explained, divide the duty on the quick change mechanism which is somewhat severe where one set of gears has to care for all the changes. The entire mechanism is a unit contained within a housing that is held to the bed by dowel pins and four screws.

The carriage bridge has an oil trough to return the cutting lubricant inside the V's, which are lubricated and cleaned by shear wipers fastened to the carriage. The compound rest is held to the bottom slide by bolts placed at some distance from the center to give a firm hold and be readily accessible to the operator.

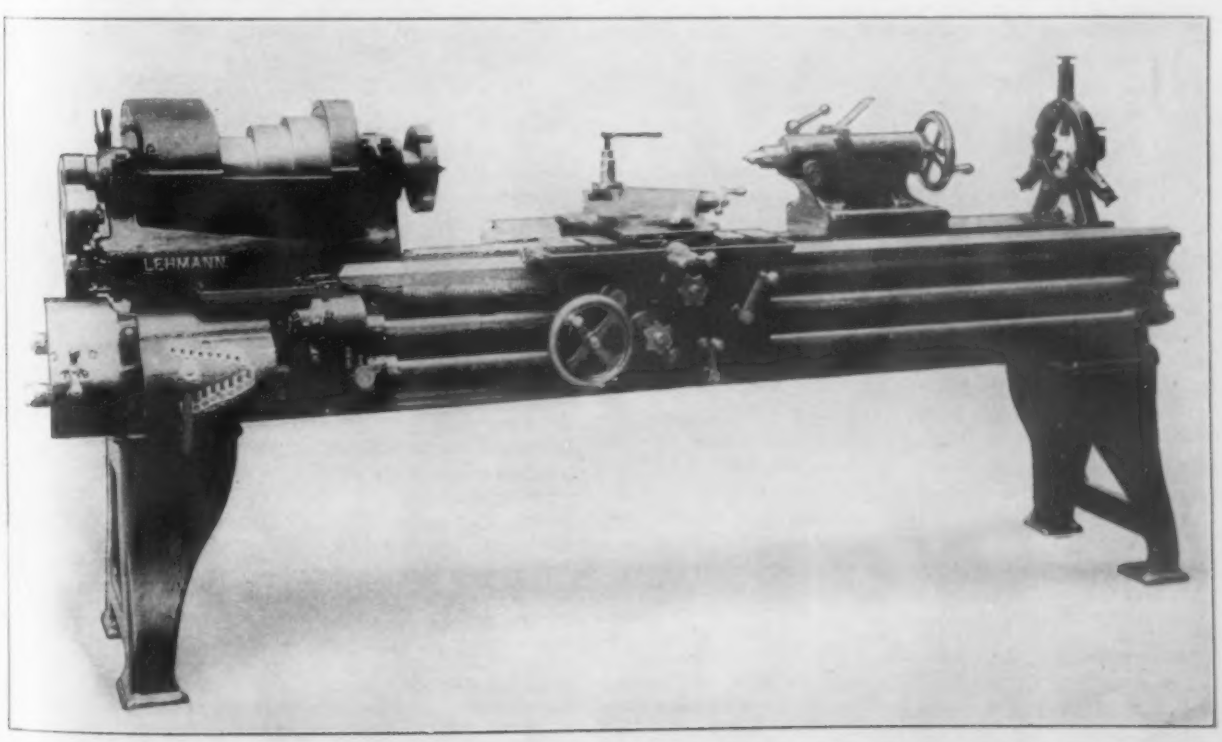
The apron is tongued and grooved to the carriage and a double support for the studs and a double bearing for the running shafts are provided by a back plate. A safety device prevents the engagement of the feed rod and the lead screw at the same time, and an adjustable collar on the former serves as an automatic stop for the carriage feed. A link connection between the apron and the half nut is provided with a view to reducing wear and resultant lost motion.

Bolts brought up to the top of the tailstock barrel are employed to clamp the tailstock to the bed, this arrangement being convenient for the operator. The spindle has a plug locking device set in a bearing underneath. This plug is hollowed to match the spindle. At one end it rests on a large-diameter shoulder and is free to move upward against the spindle, while the other end extends beyond the back of the tailstock casting and fits into an eyebolt which is suspended by an overhanging lug. The locking handle sets above this lug and is threaded to the eyebolt, a movement of the handle drawing the plug up against the bottom of the spindle.

Motor-Operated Alternating-Current Switches

For opening and closing switches in alternating-current circuits the Cutler-Hammer Mfg. Company, Milwaukee, Wis., has developed a scheme of motor operation for switches carrying currents as heavy as 1000 amp. The motor actuating the switch is designed so that the maximum torque is developed at a standstill, so that a small motor suffices with minimum inertia effect to be overcome and hence rapid acceleration. The motor armature is supported on ball bearings.

Shunting freight cars with a motor truck is practised at the plant of the Federal Motor Truck Company, Detroit, Mich.



A 16-In. Lathe Equipped with a Special Quick Change Mechanism in Which the Sliding Rocker Arm Is Raised or Lowered to Increase the Changes Provided by the Customary Cone of Gears

Specifications for the Export Trade

Proposal to Follow Up Government's Translations of A. S. T. M. Standards by Studying Foreign Specifications—Bureau of Standards Urged to Investigate Steel Rolling

THE recent agreement by which the U. S. Department of Commerce will translate and distribute abroad many of the standard specifications of the American Society for Testing Materials has been taken as an opportunity to tell foreign engineers how the specifications were arrived at, whether they are in general use here and how they compare with the specifications of the British Engineering Standards Committee. William R. Webster, long chairman of the Society's Committee A-1 on standard specifications for steel, has utilized the opportunity in a paper presented June 28 before the society at Atlantic City. From his own practice of some eighteen years as consulting and inspecting engineer involving the use of foreign specifications on export orders, he has indicated the advantages to be derived from the use of the specifications for export orders, and has recommended a definite plan for keeping these specifications abreast of the best engineering practice. His paper covers in part the ambitious investigation planned for the Watertown Arsenal, and the following notes have been taken from it.

INVESTIGATIONS AT WATERTOWN ARSENAL

In 1908 Gen. William Crozier, chief of the bureau of ordnance, U. S. A., offered the use of the large Emery testing machine and heavy machinery at Watertown Arsenal free of all expense to a body of engineers representing prominent manufacturers and consumers of structural materials for research work, the appropriations to that bureau having been materially increased to admit of such work. This led to an important meeting in New York attended by the commanding officer, Watertown Arsenal, and some forty engineers. Two committees were appointed to formulate definite programs.

To one committee was assigned the design, fabrication and testing of full-size steel columns up to the capacity of the large testing machine. The other committee was to investigate the structure of open-hearth and Bessemer steel ingots, blooms, billets, and finished steel as manufactured under the conditions of everyday practice. This material was to be cut up longitudinally and transversely at every stage of manufacture and to be examined for segregation, piping and other internal defects. Records were to be kept of the internal structure of the steel at different passes in rolling from the ingot to the finished material. Similar records were to be kept of the external defects, due to ingot cracks, tearing of the surface in blooming and overlaps in rolling, etc.

With this information before them the committee was to have several lots of similar ingots cast, and finished material of the same section rolled under conditions purposely arranged so as to increase each kind of internal and external defects, in order to ascertain if possible the true cause of defects of each class.

The next step in the committee's work based on the results thus obtained was to have other lots of ingots cast and finished material rolled under conditions designed to minimize or eliminate these internal and external defects. The committee expected to get in this way enough reliable data to enable them to make definite recommendations as to modifications in the manufacture and rolling of steel calculated to insure better material without great reduction of output. This work was to be done practically under the auspices of the American Society for Testing Materals, as the members of this committee were almost without exception members of that society. It was in fact expected to utilize the results of this investigation in the revision of the A. S. T. M. steel specifications, both as to manufacture and check tests on the finished product, all with a view of insuring better material.

Unfortunately, before the first series of tests had been completed, this investigation was brought to a sudden close by an Act of Congress and research work transferred to the Bureau of Standards. They have continued some parts of the investigation on the lines suggested, so far as their funds and facilities permitted, but no attempt has as yet been made to complete the work as outlined by the original Watertown committee. This is especially regrettable, since the work mapped out would have been the most complete series of tests and experiments that had ever been undertaken in this important field. Had it been carried to a conclusion, some of the problems that are troubling us to-day would doubtless have been solved, the Government would now be securing better steel for its guns and the railway companies better steel rails.

The work had been carried far enough, however, to show the great necessity of casting sound ingots, as many more internal defects were found in the ingots, blooms and finished materials than had been expected. A full set of plates containing the photographs of all the sections of this material was published by the Government in "Tests of Metals," volumes I and II, 1909. This caused several investigators both here and abroad to start experiments with different methods of casting ingots to overcome defects which were shown not to be confined to any particular locality. Excellent results have been obtained and no doubt some of these methods will soon come into more general use both in England and in this country.

RECOMMENDATIONS

It is not too much to expect that arrangements can be made with the Bureau of Standards to take up this important work with a proper committee, and that assistance can be secured from other Government departments by which the use of their heavy machinery will be obtained for cutting up the large ingots and rolled material for internal examination.

Mr. Webster accordingly recommends that the society take whatever steps may be necessary to secure the co-operation of the Bureau of Standards in this work, and that the members of the original Watertown Committee be invited to become members of any new committee that may be appointed to carry on such investigations.

INTERNATIONAL SPECIFICATIONS

The conflicting requirements on export orders, the trouble they gave, and the success of the American Society for Testing Materials in overcoming similar difficulties on home orders by the introduction of standard national specifications led the International Association to undertake the standardization and introduction of international specifications for steel. The following specifications were agreed to as representative national specifications:

English specifications published by the Engineering Standards Committee, London.

German specifications recognized by the Deutscher Verband für die Materialprufungen der Technik.

American specifications adopted by the American Society for Testing Materials.

The manufacturers of each country were asked to become familiar with the standard specifications of each of the other two countries, and to work to them whenever they were called upon to do so. It was expected that in this way the manufacturers would

gradually become accustomed to the points of difference in the three standard specifications, and that these differences might then be harmonized and a single specification agreed upon for each class of steel, the International Association for Testing Materials thus becoming a clearing house for international specifications.

This plan, however, was rejected on the claim that it gave the same value to the steel from each country although manufactured under different specifications. It was fully explained by the American members of the committee that:

> The time has passed when any specification or set of specifications with clauses calling for low phosphorus requirements based on favorable ore conditions, would tend to confine orders to any one locality or country inasmuch as the basic and duplex processes have equalized matters in this respect so that there is now no commercial advantage to be gained by insisting on specifications of this kind. Such matters can now be settled by the committee on their intrinsic merits, without reference to their commercial bearing.

After considerable delay and discussion it was proposed to start with a single specification that could be agreed upon for each class of material, and for this purpose the adoption of Lloyd's specifications for ship material with the addition of chemical requirements for sulphur and phosphorus was suggested for adoption as an international specification.

Objections were raised to these chemical requirements, and although it was shown that they were in accordance with the standard practice in this country, this had no effect whatever, and these requirements had to be withdrawn. It was then claimed that Lloyd's specifications were already recognized as international specifications, and that their adoption by the Association would not give them any added weight. Although it was frankly admitted that these specifications were satisfactory in every respect, there was an unwillingness toward their adoption as international specifications. Lloyd's specifications for ship material were thus rejected, and this practically put an end to the whole matter of international specifications after several years of useless work on the part of sub-committees in each of the three countries, who did not at first appreciate that they were really working at cross purposes.

The action of the International Association for Testing Materials at its New York Congress in 1912 practically put an end to international specifications before anything had been accomplished. A number of our own standard specifications were translated into foreign languages for the use of the members of that congress. The secretary of the International Association, when asked to send copies of these specifications to the members of the International Railway Congress Association in view of its request for such information or to authorize the American Society for Testing Materials to distribute them, replied that if the English and Germans should translate their specifications into other languages and make the same request, the Council would authorize such distribution.

SPECIFICATIONS IN FOREIGN LANGUAGES

Fortunately some of our steel manufacturers and locomotive builders, etc., distributed these specifications through their representatives abroad, and found that when the foreign engineers had these specifications before them in their own languages it was of great assistance in securing orders based on our specifications. This showed clearly that the best course for this society to follow is to improve its specifications wherever possible, and to avail itself of any proper opportunity to bring these specifications to the notice of engineers in foreign countries, and thus to make them available for use on export orders.

The society is to be congratulated that Secretary Redfield of the Department of Commerce has become interested in this matter and has seen the great advantages that would accrue to the manufacturers of this country by following such a course. He has therefore agreed to translate and publish many of our specifications into Spanish, French and Portuguese. Each specification will have the original English version attached to it, and all numeric quantities will be given in both the British and the metric systems. The Department of Commerce will also distribute these specifications among engineers abroad through its own staff and the United States consular offices.

FURTHER RECOMMENDATIONS

Since our specifications differ in some respects from those in general use abroad, a special committee of this society should be appointed to which all matters connected with differences with foreign specifications might be referred for explanation or investigation. In this way prompt action would be secured, and any matters of sufficient importance might be referred to the standing committee which has that particular class of material in charge.

VIEWS REGARDING BASIC STEEL AND DUPLEXING

It is natural that any country having iron ores low in phosphorus and sulphur will make very strong claims in favor of the use of acid open-hearth steel in preference to basic open-hearth steel. But in a country like our own where both acid and basic open-hearth steels are made in large quantities and are used side by side for most purposes, it is rather hard to understand the decided prejudice in England against basic open-hearth steel. On looking into this matter we find that it is partially due to their former experiences with this steel when the operations in the manufacture of basic steel were not so well understood as at present, and to the prejudice that has always existed in that country against basic Bessemer steel. It has been shown, too, that basic open-hearth steel made from very high phosphorus iron is not so reliable as that made from the lower phosphorus iron used in this country.

There is also decided objection in England to steel made by the duplex process, although we are getting excellent results in this country from steel made by this process. On investigation we find that in England the basic-Bessemer process is used at the start, and is followed by the open-hearth process. No doubt some of the highly oxidized basic Bessemer metal is carried through the open-hearth furnace to the finished product and this would account for the objections to this steel.

In this country the metal is first blown in the acid Bessemer converter, and is not so highly oxidized as that from the basic Bessemer converter, which doubtless accounts for the better results obtained from the steel manufactured by the former method. In ordinary American practice the duplex-process steel is now supplied on orders calling for basic open-hearth steel, without making any distinction whatever, whereas on export orders it has always been necessary to explain carefully the differences between the processes of manufacture in this country and abroad, when it is desired to use duplex steel on orders calling for basic open-hearth steel.

Resistance to Corrosion Shown by Steel Dam

The steel dam erected in 1898 by the Santa Fe Railway across Johnson's Canyon, four miles east of Ash Fork, Ariz., is reported to be in practically as good condition as when erected 18 years ago. It is 184 ft. long and 46 ft. high and consists of a series of vertical steel frames of A-section, footing on concrete bedplates on rock with an upstream inclined face of steel plates spanning the bents. According to *Engineering News* there are no evidences of corrosion except where the plates came in contact with mud of the reservoir. An original coating was given the structure of two applications of dry red lead and boiled linseed oil. Since that time it has been painted but twice, each time with a single coating of graphite. By means of a bypass the structure is readily exposed and can be inspected and painted without interference from the water.

The Ohio Brass Company, Mansfield, Ohio, has arranged to take over the exclusive sales of the Crouse-Hinds Company, Syracuse, N. Y., maker of street car headlights.

Regulating and Balancing Production*

How the Production Department Coordinates the Work of Over 20 Factory Departments to Complete Orders on Time

BY H. A. RUSSELL

IN the manufacture of agricultural implements and heavy farm machinery more than 20 separate and distinct departments are necessary. First is the experimental department which keeps the varied lines up to date. Next, drafting room, embodies the results received from successful experiments, together with ideas and suggestions from the engineering department in drawings and specifications. Then in regular order come the pattern department, the foundry and machine shop, after which the finished castings proceed to the storage bins near the assembling floor. The blacksmith department furnishes steel parts, braces, axles, tires, levers and bolts of all sizes. Some of these go directly to the carpenter shop, where they are attached to the wood parts, while others pass through the machine shop before they are ready to become a part of the finished machine or implement. Other departments concerned with the product are the sheet-iron department, the bolt room, the buffing department, the wheel room and the paint and the packing departments, and each must deliver its part promptly. Neither can the boiler shop, the sawmill department and others be allowed to fall behind.

MOULDERS WORK CARD

PATTERN NO. A164 DATE ORDERED 1-5-16

FOR MACHINE 8½×11 Engine

PART NAME Balance Disc

DATE COMPLETED NUMBER REQUIRED 210

Made Good
Made Good
Made Good
Made Good
Made Good
No. Bad

RUSH

MAN'S NO. TOTAL GOOD WEIGHT 1 PIECE TOTAL WEIGHT

WHEN ORDER IS COMPLETED RETURN ORDER TO FOUNDRY OFFICE

Fig. 1—The molder enters each day the number of good castings made. When the job is complete the card is sent to the production department. Size of card, 3 x 5 in.

ESTABLISHMENT OF THE PRODUCTION DEPARTMENT

In years past each foreman endeavored to regulate the production of his department, so that he would not be seriously behind or ahead of the other departments. For the most part his successes or failures were the result of guesswork. At times he would not have a sufficient quantity of all the different items required. He would make as many of the needed parts as his supply of raw material would permit. And while he would be keeping the men in his own department busy, he would not be giving the next department the correct proportion of parts required to turn out a maximum quantity of completed machines. Often the part needed first would be received last. To overcome such discrepancies and shortages it was necessary to establish a separate production department which would be capable of so correlating the output of the separate units of the factory that production would be increased and costs lowered.

The more uniform the flow of the finished parts, the lower the cost of the completed machine. The most important duty of the production department is to see that the volume of rough parts sent to the finishing departments, and then onward to the erecting floors, is continuous and well balanced. The duties of this department may be divided into two groups. The first pertains to the making and finishing of many thousands of gray iron, steel and malleable castings, steel or iron forgings and all wood parts. The second group covers the entire line of completed machines and implements, and the methods of preparing a stock of any machines to anticipate seasonal demands.

PLANNING THE SEASON'S NEEDS

Before the production department can issue a single order to the factory it must have some basis from which to plan. The sales department estimates the quantity, size and style of each machine or implement which will be required in the coming season. These estimates are known as the "Estimated Sales," and a copy of each goes to the production and purchase departments. The purchase department analyzes its copy and prepares to buy all items which must be procured from outside, arranging deliveries so that these will be on hand when required, but not too far in advance.

The production department makes up its lists of the parts which will be made in the factory. The first step is to inventory the parts on hand. This is done principally to check the existing records. These are in the nature of a perpetual inventory, but always show a slight variation from the actual facts at the end of a six-month or yearly period.

ORDERING THE CASTINGS

Presuming that the reports of the parts on hand have been received and that the records have been corrected, the production chief has filled in a num-

GOODS RECEIVED

DATE 1-11-16

Department #6

PIECES	DESCRIPTION
48	A245 Box
53	A198 Cylinder head
20	A164 Balance disc ←
27	A231 Steam chest lid

SIGNED G. B.

SEND DAILY TO PRODUCTION DEPARTMENT COPY OF THIS REPORT

Fig. 2—Each department lists daily the material received from every other department, and transmits the information to the production department. Size of sheet 8½ x 11 in.

*The first of three articles describing the production methods of a large agricultural implement factory.

ber of the molders' work cards (Fig. 1). He sends these to the foreman of the foundry, ordering first the castings needed first. The greater majority of the molders' work cards do not have the word "rush" on them, as is shown in the illustration. "Rush" cards take precedence over the others. This card is made from medium weight buff cardboard. Since it goes from the foreman to the molder it must be capable of standing hard usage.

The molder enters on this card, daily, the number of good castings made. The foreman and assistant foreman know from day to day just how much work each molder has ahead of him, and also the quantity which is to be applied against each production order. When the required number of good castings has been made, the card is returned to the foreman and by him to the production department. The same cards are used for gray iron and brass castings, and for one piece or a thousand. Before any of the cards leave the production department the quantity ordered is entered on the "Production-Operation Cost Record" card, as will be explained later.

Each day the castings are taken from the foundry to the machine shop by trucks. They are counted and entered on the "Goods Received Sheet" (Fig. 2) by quantity, symbol and number and description. These sheets are sent to the production department daily and the quantities of each casting are entered on the "Production-Operation Cost Record" card, as will also be explained later. Thus the molder's work card (Fig. 1) specifies 210 A164 crankshaft balance disks for Ajax engines. The "Goods Received Sheet" shows that 20 of these pieces, among other items, have been received in the machine shop. This casting will be followed through the various machine operations up to the time that it becomes a part of the finished machine.

ORDERS FOR STEEL PARTS

Parts made from bar steel of various grades, such as soft, dead soft, plow, spring and hard or high carbon steels, are ordered by means of the production order. Fig. 3 shows one issued to the blacksmith shop, department No. 14. These are prepared in the same manner as the molder's work card, an inventory being taken before the production order is issued. The production chief sends out these various orders as needed, so that the parts will follow each other in their proper sequence. Certain parts requiring little work are not ordered until the other parts have progressed so far that all parts will reach the assembling floors at about the same time. In ordering castings the only point to be considered is the order in which the castings should reach the machine shop. It is assumed that the foundry has on hand sufficient pig iron and scrap to work without interruption. For steel parts, however, other items must be considered, as the supply of the needed sizes of steel on hand, and the length of time required to secure additional quantities. Daily consultation and active co-operation between the production and purchase departments furnish the means whereby the production chief may issue intelligently the production orders for steel parts. On the other hand, the purchase department, at all times, must keep in touch with the factory production to anticipate requirements. If a serious delay in securing certain pur-

Form N-2

PATTERN RECORD

NAME AND DESCRIPTION OF PART Pinion

FOR MACHINE Saw Mill SIZE 22A

PATTERN NO. (NEW PATTERN) S763 DATE MADE 1/4/16

PATTERN NO. (AFTER CHANGING) DATE CHANGED

MATERIAL Brass DATE NUMBERED 1/4/16

NUMBER PER MACHINE 2 DRAWING NUMBER B4147

TAKES PLACE OF New

REMARKS If Stock 1/4/16 can be used for repairs in place of A72

SIGNED K.A.S.

Fig. 4—The pattern record gives complete information regarding every pattern. Size of card, 4 x 6 in.

chased parts is apparent, it may be more economical to make these, if it is possible to do so, than to wait for them. It does not pay to have a lot of partly-completed machines standing around, and the few extra dollars expended in making the parts may be a good investment.

PATTERN NUMBERS

The production department has charge of the numbering of all patterns. The instructions regarding patterns and pattern numbering are as follows:

1. All new patterns must be numbered. 2. All new parts must also be assigned a number. 3. All *changed* patterns or parts—changed so that they are no longer interchangeable with old parts—must be assigned a new number. 4. The production department assigns these numbers. 5. A complete and up-to-date record must be kept of all pattern numbers now in existence, all new numbers, with date of issue and all changed numbers, showing the old and new numbers and date of change.

For keeping track of all numbers, new, old or changed, the pattern record card (Fig. 4) is used.

It will be noted that a number of the forms are filled in on the typewriter. The usual method, however, is to use a pen or pencil.

Subsequent articles will explain and illustrate: The methods used in keeping track of parts in the rough, partly finished and finished states; the methods of checking these parts as they proceed from one operation to another and finally become a part of the finished machine; the record or perpetual inventory of finished machines on hand, and the methods of checking these off as shipped; the record of the machine after it is shipped, so that when the customer

PRODUCTION ORDER

Department #14

ORDER NO.	PIECES WANTED	PATTERN NO.	PART NAME	DATE ORDERED	DATE FINISHED
4108	500	S719	Saw mill brace	1-4-16	
"	100	S720	" " "	"	
"	100	S419	" " "	"	
"	200	S497	" " "	"	
"	200	S641	" " "	"	
"	100	S393	" " lever	"	
"	100	S467	" " Draw rod	"	
			WHEN ORDER IS COMPLETED RETURN TO PRODUCTION DEPARTMENT		

Fig. 3—The production order is used for ordering steel parts. This sheet, 8½ x 11 in., is filled in with the name and symbol of each piece, the quantity required and the order number and sent to the blacksmith department

gives the shop number of the machine, which is stamped in the name plate, the repair parts can be furnished. The next article will deal with finished and partly finished parts.

METALLURGY OF RARER METALS

Importance and Future of Magnesium, Calcium, Chromium and Other Metals

An interesting paper on "The Metallurgy of the Rarer Metals" was presented by Prof. J. W. Richards, of Lehigh University, South Bethlehem, Pa., before the eighth semi-annual meeting of the American Institute of Chemical Engineers in session at the Statler Hotel, Cleveland, Ohio, June 14 to 17. Professor Richards stated there are many metals which may be called the rarer metals but the most interesting among these, both to the metallurgist and economist, are those metals whose compounds are relatively cheap and which command high prices because of the difficulty of their reduction. These are metals whose market prices may at some time he reduced anywhere from one-half to nine-tenths by improved methods of reduction. He said that if his paper had been written 30 years ago, aluminum would be one of the metals that would be discussed, being in 1886 one of the rarer metals selling at $10 per lb. The silicon industry furnishes another example of great reduction in the cost of the metal. This, in 1900, was selling as a chemical curiosity at over $100 an ounce; now 10c. per pound is a good market price for it.

BERYLLIUM AND BORON

The speaker referred at length to the number of metals that at present command high prices, but which by improved metallurgical processes might be made very cheaply. These include, beryllium, boron, magnesium, calcium, strontium, zirconium, molybdenum, barium, titanium, chromium and cerium (mixed metals of the cerium group). He said the present methods of reducing beryllium are tedious and costly and that it is not to be expected that this metal can be made cheaply until someone masters the direct electrolysis of the oxide, dissolved or suspended in a more stable melted salt, which is by no means an impossibility. He said this metal being white, malleable and unchanged in air, with a specific gravity of 1.64, would make it particularly useful for objects where great lightness and permanence in air are the first consideration, with the cost secondary. He characterized it as a metal that will repay extended metallurgical research and minute physical and chemical study of its many unique properties.

MAGNESIUM AND ITS FUTURE

Professor Richards said that the metallurgist has not made a fraction of the progress that he should have made with magnesium. Although magnesium oxide costs only a few cents per pound the metal sells for about as many dollars per pound and is scarce. But it is believed that, by improving the methods, the reduction of magnesium can be produced at 25c. per lb. He said that while the war lasts, with its enormous demand for magnesium for military purposes, the price will remain in the dollars per pound, but with improved processes that are being developed he believes that after the close of the war, with normal industrial conditions, magnesium will sell at a price which will take it out of the class of rarer metals and put it among the common ones. As the price goes down its industrial uses will increase in geometrical proportion, and instead of the production being expressed in thousands of pounds per year it will reach thousands of tons. This will be one of the by-products of the war's stimulus to metallurgical industry.

The speaker said that the possibilities held out to the metal industry by reasonably cheap magnesium are extremely interesting, and that it is quite possible that alloys analogous to dur-alumin may be discovered, as strong as soft steel with only 30 per cent of its weight, which will find extensive use in aeroplanes and dirigibles. Such alloys may largely displace aluminum alloys, which are now used by the thousands of tons annually in the automobile industry, with a saving of one-third in weight which will compensate for the higher first cost. He predicted that the metallurgical use of magnesium will also be greatly extended by its lower price, such as for deoxidizing brass, copper, bronze, nickel and monel metal, since it is a much stronger deoxidizer than aluminum. In fact, aluminum has blazed the way into numerous uses for which magnesium, as soon as it becomes cheaper, will compete and replace its older sister. He predicted a large future for magnesium as one of the common metals of every-day life.

CALCIUM IN ALLOYS AND AS A DEOXIDIZER

Calcium, strontium and barium were referred to as the trio of highly interesting elements, common enough in nature but scarce and of high price because of the metallurgical lack of efficient and cheap methods of reduction. Calcium was referred to at present as a semi-rare metal which could be produced much cheaper by present methods if made on a large scale to fill a large demand. The principal trouble at present is in finding uses for the large production. He said its possible alloys with other light metals should be exhaustively studied, and that another large possible use is as a chemical purifying agent in melting and castings metals.

A small addition of metallic calcium might be used to reduce the amount of sulphur and phosphorus in steel, and other metals and alloys whose properties are damaged by sulphur or phosphorus may be similarly refined or improved. Barium was referred to as a metal that could be obtained in large quantities if its uses were developed. As barium is a good conductor, its use was suggested for electrical contrivance, and there are possibilities that its cost can be very materially reduced.

GROWING IMPORTANCE OF CHROMIUM

The fact that the use of chromium in steel is rapidly extending to all varieties of extra hard and high-speed steel was referred to and the paper stated that the use of pure chromium is limited by its high cost of production and our lack of knowledge as to how to handle it and its possible useful effects. For example, chromium electroplating is white and durable and for many purposes may be superior to nickel and almost equal to platinum plating, but the technique of always getting perfect plating has not been mastered.

Ferrochromium alloy carrying high carbon (6 to 8 per cent) is produced cheaply in crucibles, cupola furnaces, blast furnaces and electric furnaces. Low-carbon ferrochromium commands three to five times as high a price because of the difficulty of decarbonizing the raw product. The speaker hoped that a test would be made in the electric shaft furnace to see if it is not possible to produce directly from the ore a low carbon product and said the present prices, $100 and $500 a ton respectively for the high and low alloys, would warrant a great effort in that direction.

Professor Richards stated that the metallurgy of chromium is full of attractive possibilities and the usefulness of pure chromium in the field of alloys is only beginning to be scratched. The scratch, however, has proven very much worth while. The success of A. J. Rossi and the Titanium Alloy Mfg. Co. in producing ferrotitanium alloy from the enormous quantities of titaniferous iron ore in Northern New York and Canada was referred to and the speaker said that, if uses are found for pure titanium, some other than electric furnaces must be used to reduce it. These methods of reducing pure titanium are, like its prospective uses, still in the future. The metal is now quoted at about the price of silver and if the problem is properly faced it could probably be made as cheap as chromium.

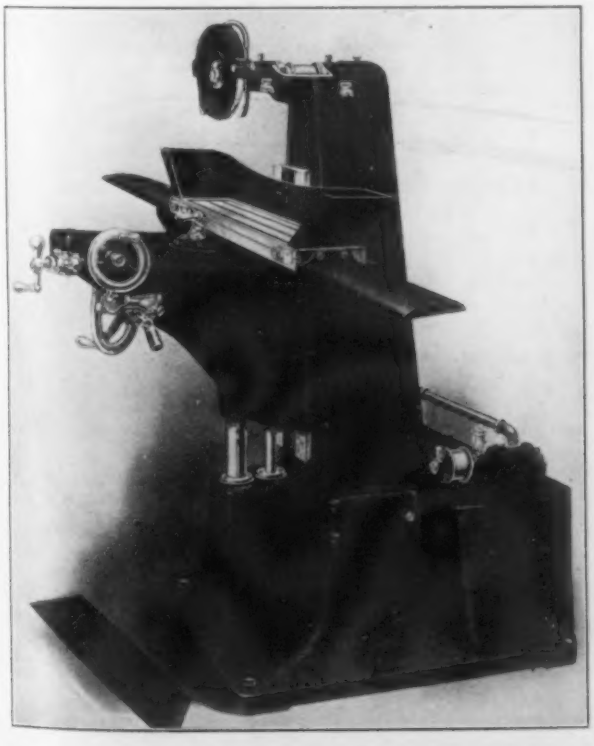
The first train of a rolling mill recently commenced operations at Port Moody, British Columbia. When the plant is completed it will consist of two units. E. Francis is president of the company.

Automatic Surface Grinding Machine

A single surface grinding machine designed for either wet or dry work has been developed by the Grayson Tool & Mfg. Company, Indianapolis, Ind. A somewhat special type of automatic table traversing mechanism, provision to secure approximately the same cutting speed irrespective of the diameter of the wheel that is being used, and the use of dust guards for the elevating screw and the vertical shaft for the automatic table mechanism may be numbered among the features. The machine, it is emphasized, can be used either in the toolroom or machine shop where pieces requiring surface grinding are produced.

The grinding wheel spindle is of high-carbon steel that has been hardened and finished by grinding, the threads on the taper portion being chased after the grinding has been done. This procedure is relied upon to avoid the distortion of threads that is sometimes caused in the hardening of the spindle. Phosphor bronze is used for the bearings, and after the head has had a run of 10 hr. in the builder's testing department it is taken apart and the bearings are scraped. The spindle is lubricated through four plugs of birchwood, the oil being supplied at the small end of the bearing, which, it is pointed out, secures a constant flow of thin film to the large end. Three spindle speeds are provided by a three-speed countershaft to enable the operator to secure practically the same cutting speed with a 3-in. wheel as with one 8 in. in diameter.

The table has a reciprocating motion of 20 in. at two rates of speed and a traverse of 6¾ in., both of which are controlled automatically. The automatic mechanism is of somewhat novel construction. A two-step cone pulley on the end of the emery wheel spindle drives a hardened steel worm and phosphor bronze worm gear, which revolves the vertical shaft shown under the knee toward the rear, and this shaft in turn drives a nest of bevel gears. A clutch which is reversed by the action of the two adjustable dogs on the front of the table controls the change in direction of the table travel and spring cushions provided for the dogs are relied upon to eliminate shock and give a practically silent movement. The handle by which the release of the automatic traverse of the table is controlled may be seen projecting a trifle under the table.

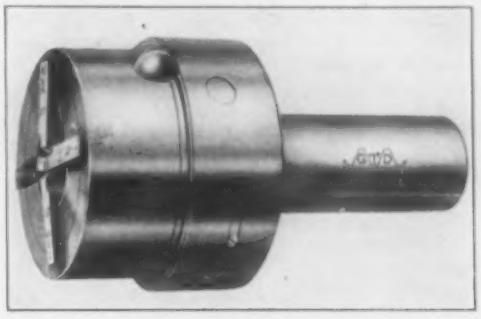


In This Single Surface Grinding Machine a Special Automatic Table Traversing Mechanism Is Employed

The elevating screw, which is protected by a guard from emery dust, is regulated by the handle at the left of the knee. The screw can be seen below the knee and is the one nearer the front. Both hand and power feed are provided for the table, the handwheel above the knee being used to regulate the hand feed, while the power feed is engaged or thrown out by the handle below the knee, the direction being controlled by the knurled knob above the handle.

A Self-Opening Die of Improved Form

Guarding the openings for the chaser set screws and the substitution of a ball-shaped latch at the side are the features of a new style of self-opening die that has been brought out by the Greenfield Tap & Die Corporation, Greenfield, Mass. In the design of this die the self-opening die principles are retained.



A Self-Opening Revolving Die Having the Chaser Set Screw Openings Protected by a Sliding Steel Shell and Using a Ball Shaped Latch to Open It Upon the Completion of the Work Instead of a Projecting Face Trip

A light steel shell now covers the openings for the chaser set screws which were formerly exposed. This shell, which is relied upon to prevent the entrance of chips into the openings and consequent interference with the work, can be turned instantly to expose the screws when it is desired to release and remove the chasers, this being done in the usual way. The die was brought out particularly for use where the work is stationary, and a ball-shaped latch at the side has been substituted for the projecting face trip formerly employed for opening the die when the cut is finished.

Record Output of Bauxite and Aluminum in 1915

Bauxite and aluminum output in the United States in 1915 reached record proportions according to the U. S. Geological Survey. The production of bauxite was 297,041 gross tons, valued at $1,514,834, an increase of 77,723 tons or 35 per cent and of $445,640 or 41 per cent over the 1914 output. This very large increase was due to increased activity in the aluminum industry and the greatly lessened amount of foreign bauxite imported. Of a total consumption of more than 300,000 tons, little more than 1 per cent was imported. Arkansas is credited with more than 90 per cent of the domestic output, and Georgia, Alabama and Tennessee with the remainder.

Metallic aluminum consumed in the United States in 1915 was 99,806,000 lb. and there was still a great scarcity, according to W. C. Phalen of the Survey. This was due to a greatly increased demand and a curtailment of imports. Aluminum powder has been extensively used in making ammonal, a high explosive, by mixing it with ammonium nitrate.

The furnace of the Charcoal Iron Company of America at Ashland, Wis., is experimenting with iron ore obtained from the Cuyuna range in Minnesota, after using Gogebic range ore exclusively for many years. The Cuyuna ore is much harder than the Gogebic.

Foundrymen's Convention and Exhibition

Program for the Cleveland Meeting of the American Foundrymen's Associations and Partial List of Those Who Will Exhibit

The success of the exhibition of foundry equipment and accessories and machine tools to be held at Cleveland during the week of Sept. 11, at the time of the annual meetings of the American Foundrymen's Association and the American Institute of Metals, is already indicated by the large number of manufacturers who have made reservations for space. About 90 per cent of the exhibition area of the Coliseum has been disposed of, and since 10,000 sq. ft. additional will be required to meet the needs of prospective exhibitors it has been decided to erect a temporary building on a lot directly across the street from the exhibition hall. At a meeting of the exhibition committee of the American Foundrymen's Association, held at the Hotel Statler, Cleveland, on Saturday, June 24, the erection of this annex was authorized.

The Exhibition

The two buildings will be connected by a runway, making it unnecessary for the visitors to descend to the street when passing from one to the other. In the temporary structure all the large operating machines requiring heavy foundations will be placed and it is probable that several different types of melting furnaces will be shown in operation. The annex will be converted into a temporary foundry where molds will be made and poured. Since the Coliseum was erected with its 60,000 sq. ft. of floor space many shows have been held in it, but the foundry exhibition is the first to make necessary the erection of an annex.

Although the exhibition is more than two months away, 98 manufacturers have made reservations and the indications are that this total will be swelled to 150 when the doors are thrown open on Monday, Sept. 11, against 102 at Atlantic City last year. Never has so much space been reserved so far in advance of the opening. The complete list of manufacturers who have made application for space follows:

LIST OF EXHIBITORS

American Gum Products Company, New York.
Arcade Mfg. Company, Freeport, Ill.
Armstrong Cork Company, Pittsburgh.
E. C. Atkins & Co., Indianapolis.
Ayer & Lord Tie Company, Chicago.
B. & B. Mfg. Co., Indianapolis.
Berkshire Mfg. Company, Cleveland.
Charles H. Besly & Co., Chicago.
S. Birkenstein & Sons, Chicago.
Blystone Mfg. Company, Cambridge Springs, Pa.
Brass World Publishing Company, New York.
Brown Specialty Machinery Company, Chicago.
Carborundum Company, Niagara Falls, N. Y.
Cataract Refining & Mfg. Company, Buffalo.
Chicago Pneumatic Tool Company, Chicago.
Cleveland Blow Pipe & Mfg. Company, Cleveland.
Cleveland Pneumatic Tool Company, Cleveland.
Thomas E. Coale Lumber Company, Philadelphia.
Curtis Pneumatic Machinery Company, St. Louis.
Davis-Bournonville Company, Jersey City, N. J.
Joseph Dixon Crucible Company, Jersey City, N. J.
Excelsior Tool & Machine Company, East St. Louis, Ill.
Federal Foundry Supply Company, Cleveland.
Felt & Tarrant Mfg. Company, Chicago.
Gardner Machine Company, Beloit, Wis.
General Electric Company, Schenectady, N. Y.
Gibb Instrument Company, Pittsburgh.
Gisholt Machine Company, Madison, Wis.
Goldschmidt Thermit Company, New York.
Graceton Coke Company, Graceton, Pa.
Great Western Mfg. Company, Leavenworth, Kan.
F. A. Hardy & Co., Chicago.
Benjamin Harris & Co., Chicago.
Herman Pneumatic Machine Company, Pittsburgh.
Herold Bros. Company, Cleveland.
Hill-Brunner Foundry Supply Company, Cincinnati.
Hoevel Mfg. Corporation, New York.
Ingersoll-Rand Company, New York.
International Molding Machine Company, Chicago.
Interstate Sand Company, Zanesville, Ohio.
THE IRON AGE, New York.
Jennison-Wright Company, Toledo, Ohio.
Julius King Optical Company, New York.
Lehigh Coke Company, South Bethlehem, Pa.
Lincoln Electric Company, Cleveland.
David Lupton's Sons Company, Philadelphia.
J. S. McCormick Company, Pittsburgh.
MacLean Publishing Company, Toronto, Ont.
Macleod Company, Cincinnati.
Mahr Mfg. Company, Minneapolis.
Malleable Iron Fittings Company, Branford, Conn.
Manitowoc Electric Implement Company, Manitowoc, Wis.
Metal Industry, New York.
Midland Machine Company, Detroit.
Moldar Co. (Richey, Browne & Donald), Maspeth, N. Y.
Moltrup Steel Products Company, Beaver Falls, Pa.
Monarch Engineering & Mfg. Company, Baltimore.
Motch & Merryweather Machinery Company, Cleveland.
Mott Sand Blast Mfg. Company, Chicago.
E. H. Mumford Company, Elizabeth, N. J.
National Engineering Company, Chicago.
New Haven Sand Blast Company, New Haven, Conn.
Norma Company of America, New York.
Norton Company, Worcester, Mass.
S. Obermayer Company, Chicago.
Oliver Machinery Company, Grand Rapids, Mich.
Osborn Mfg. Company, Cleveland.
Oxweld Acetylene Company, Chicago.
Pangborn Corporation, Hagerstown, Md.
Penton Publishing Company, Cleveland.
Pickands, Brown & Co., Chicago.
Portage Silica Company, Youngstown, Ohio.
Henry E. Pridmore, Chicago.
Pyrotectite Company, Chicago.
Robeson Process Company, New York.
Rogers, Brown & Co., Cincinnati.
Sand Mixing Machine Company, New York.
W. W. Sly Mfg. Company, Cleveland.
Smith Facing & Supply Company, Cleveland.
R. P. Smith & Sons Company, Chicago.
Werner G. Smith Company, Cleveland.
Snyder Electric Furnace Company, Chicago.
Standard Sand & Machine Company, Cleveland.
Sterling Wheelbarrow Company, West Allis, Wis.
Frederic B. Stevens, Detroit.
Strong, Kennard & Nutt Company, Cleveland.
Sullivan Machinery Company, Chicago.
Superior Sand Company, Cleveland.
Thomas Elevator Company, Chicago.
Titanium Alloy Mfg. Company, Niagara Falls, N. Y.
Union Steam Pump Company, Battle Creek, Mich.
U. S. Graphite Company, Saginaw, Mich.
U. S. Molding Machine Company, Cleveland.
United States Silica Company, Chicago.
J. D. Wallace, Chicago.
Warner & Swasey Company, Cleveland.
White & Bro., Philadelphia.
Whiting Foundry Equipment Company, Harvey, Ill.
E. J. Woodison Company, Detroit.

The Foundrymen's Convention

The papers and committee reports to be presented at the annual meeting of the American Foundrymen's Association promise a highly valuable and interesting program. Separate sessions will be held for the discussion of topics relating to the manufacture of gray and malleable iron and steel castings. The opening meeting will be held at the Hotel Statler, Monday afternoon, Sept. 11, which will be followed by morning sessions only, the convention closing on Friday, Sept. 15. This arrangement will afford the foundrymen more opportunity to inspect the exhibits than they have had in former years with two sessions daily, although the length of the program will necessitate several simultaneous meetings.

Three symposiums will feature the program, the subjects of which follow. "The Results of Closer Co-

operation Between the Engineer and the Foundry as Related to Gray and Malleable Iron, Steel and Non-Ferrous Metals"; "The Influence of Gating on Castings, including Gray and Malleable Iron, Steel and Non-Ferrous Metals," and "Electric Furnace Practice as Related to the Production of Steel Castings." Four authors will prepare papers for each of these symposiums. Several interesting papers on sand reclamation will be presented, covering investigations made by members of the American Foundrymen's Association and by the United States Bureau of Standards. A partial list of papers already promised and the names of their authors follows:

FOUNDRY CONVENTION PAPERS

Sand Reclamation, by H. B. Swan, Cadillac Motor Car Company, Detroit.

Progress Report on Sand Reclamation, by C. P. Karr, associate physicist, U. S. Bureau of Standards, Washington, D. C.

Symposium on Results of Closer Co-operation Between the Engineer and the Foundry as Related to

Gray Iron, by D. W. Sowers, Sowers Mfg. Company, Buffalo.

Steel, by John Howe Hall, Taylor-Wharton Iron & Steel Company, High Bridge, N. J.

Malleable Iron (author not yet determined).

Non-Ferrous Metals, by C. E. Chase, Modjeski & Angier, Chicago.

Symposium of the Influence of Gating on Castings, including

Gray Iron, by B. D. Fuller, Westinghouse Electric & Mfg. Company, Cleveland.

Steel, by William Gilmore, Hubbard Steel Foundry Company, East Chicago, Ind.

Malleable Iron, by A. M. Fulton, Fort Pitt Malleable Iron Company, Pittsburgh.

Non-Ferrous Metals, by R. R. Clarke, Pennsylvania Railroad Company, Pittsburgh.

The Significance of the Fire Waste, by Franklin H. Wentworth, secretary National Fire Protective Association, Boston.

Profit Sharing in the Jobbing Foundry, by C. E. Knoeppel, New York.

What the Pratt Institute Has Done, Is Doing and Hopes to Do in the Training of Men for the Foundry Industry, by Samuel S. Edmands, Pratt Institute, Brooklyn.

The Installation of Uniform Cost Systems by Members of Technical Societies, by Clinton H. Scovell, Clinton H. Scovell & Co., Boston.

Report of the Committee on Foundry Costs, by B. D. Fuller, chairman, Westinghouse Electric & Mfg. Company, Cleveland.

Report of the Committee Advisory to the U. S. Bureau of Standards, by Richard Moldenke, chairman, Watchung, N. J.

Report of the Committee on Safety and Sanitation, by Victor T. Noonan, chairman, Industrial Commission of Ohio, Columbus.

Report of Representatives on the Conference Board on Training of Apprentices, by B. D. Fuller, chairman, Westinghouse Electric & Mfg. Company, Cleveland.

STEEL

Symposium for Electric Furnace Practice for the Manufacture of Steel Castings by

F. T. Snyder, Snyder Electric Furnace Company, Chicago.

A. B. Clarke, Buchanan Electric Steel Company, Buchanan, Mich.

John A. Crowley, John A. Crowley Company, New York.

Making Electric Steel in the Rennerfelt Flaming Arc Furnace for Foundry Purposes, by C. H. Vom Baur, Hamilton & Hansell, New York.

Crucible and Electric Steel Compared, by T. S. Quinn, Lebanon Steel Foundry, Lebanon, Pa.

Converter and Electric Steel for Casting Purposes Compared, by Peter Blackwood, Monarch Steel Casting Company, Detroit.

Manganese Steel Castings, by W. S. McKee, American Manganese Steel Company, Chicago.

Titanium in Steel Castings, by W. A. Janssen, Bettendorf Company, Davenport, Iowa.

Report of Committee on Steel Foundry Standards, by Dudley Shoemaker, chairman, Atlantic Steel Casting Company, Chester, Pa.

Report of Committee on Specifications for Steel Castings, by John Howe Hall, chairman, Taylor-Wharton Iron & Steel Company, High Bridge, N. J.

The Small Open Hearth as a Flexible Unit for Either Large Steel Foundries or General Jobbing Shops, by Frank Carter, Milwaukee.

The Presence of Alumina in Steel, by G. F. Comstock, Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

The Particular Application of Green Sand Molding in the Steel Foundry, by A. F. S. Blackwood, Monarch Steel Casting Company, Detroit.

Theory and Practice of Heading and Gating Steel Castings, by Ralph H. West, West Steel Casting Company, Cleveland.

Acid versus Basic Steel for Making Castings, by E. F. Cone, THE IRON AGE, New York.

Alloy Steel Castings, by David Evans, Chicago Steel Foundry Company, Chicago.

GRAY IRON

The Effect of Different Mixtures on the Strength of Chilled Car Wheels, by G. S. Evans, Lenoir Car Works, Lenoir City, Tenn.

The Manufacture of Semi-Steel Castings, by David McLain, McLain's System, Milwaukee.

The Use of By-Product Coke in Foundry Operations, by George Long, Pickands, Brown & Co., Chicago.

How Certain Cleaning Room Problems Have Been Solved, by H. Cole Estep, Cleveland.

The Use of Borings in Cupola Operations, by James A. Murphy, Hooven, Owens, Rentschler Company, Hamilton, Ohio.

One-Third of a Century in a Gray-Iron Foundry, by Alfred E. Howell, Phillips & Buttorff Mfg. Company, Nashville, Tenn.

The Introduction of Molding Machines in Foundries, by A. O. Backert, Penton Publishing Company, Cleveland.

The Experimental Foundry, by H. K. Hathaway, Tabor Mfg. Company, Philadelphia.

Report of Committee on Standard Methods for Coke Analysis, by H. E. Diller, chairman, General Electric Company, Erie, Pa.

Report of Committee on Standard Specifications for Foundry Scrap," by G. E. Jones, chairman, Whiting Foundry Equipment Company, Harvey, Ill.

Report of Committee on General Specifications for Gray-Iron Castings, by W. P. Putnam, chairman, Detroit Testing Laboratories, Detroit.

MALLEABLE IRON

The Application of Malleable Iron Castings in Car Construction, by Frank J. Lanahan, Fort Pitt Malleable Iron Company, Pittsburgh.

Commercial Side of the Malleable Iron Industry, by W. S. Kranz, National Malleable Castings Company, Cleveland.

Report of Committee on Specifications for Malleable Iron Castings, by Enrique Touceda, chairman, Albany, N. Y.

Papers will be presented on various subjects relating to malleable iron practice by the following authors:

Edwin F. Leigh, Marion Malleable Iron Works, Marion, Ind.

S. H. Standish, Northwestern Malleable Iron Company, Milwaukee.

G. Meehan, Ross-Meehan Foundry Company, Chattanooga, Tenn.

Enrique Touceda, Albany, N. Y.

W. A. Forbes, Rockford Malleable Iron Works, Rockford, Ill.

A. H. Chapelka, Chisholm & Moore Mfg. Company, Cleveland.

Local Committees

To provide for the entertainment of the visiting foundrymen and to direct them in plant visitation, local committees have been organized, the chairmen of which held their first meeting at the Hotel Statler, Cleveland, on Saturday, June 24. F. B. Whitlock, Interstate Foundry Company, has been appointed chairman of the general directing committee which consists of the chairmen of the other committees, as follows:

Plant Visitation, J. S. Smith, Smith Facing & Supply Company.

Entertainment, Sterling Hubbard, Rogers, Brown & Co.

Reception, Herbert Boggis, Taylor & Boggis Foundry Company.

Golf, W. B. Greene, Palmer & De Mooy Foundry Company.

Finance, J. C. Brainerd, Johnston & Jennings Company.

Ladies' Entertainment, Mrs. W. C. Sly, 13,474 Lake Avenue.

An entertainment program is being outlined which includes the annual banquet of the American Foundrymen's Association and the American Institute of Metals, at the Hotel Statler, Thursday evening, Sept. 14. Full opportunity also will be afforded for plant visitation.

In view of the great activity prevailing in the foundry industry, making necessary the almost continuous service of every available employee, many foundry operators are planning the vacations of their plant executives for convention week.

ESTABLISHED 1855

THE IRON AGE

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Midsummer Armor-Plate Fiction

Naturally the movement for the building of a Government armor-plate plant has brought keen bidding for the location. As with other features of the program for Government entrance upon this or that industrial activity, there has been a good deal of exaggeration in argument. About as ridiculous an example of such exaggeration is one of the statements put out on behalf of a Southern site. We are told that as 95 per cent (sic) of the steel products of the country come from the ore of the Lake Superior region, all of which "passes through a short canal that could at any moment be blocked by the explosion of a few sticks of dynamite," such dynamiting would cause "an instant collapse" of the iron and steel industry of the North. The fearful blunder of locating a Government armor-plate plant anywhere in the North would then be apparent, but all too late.

Even allowing for every happening in this hysterical program for the blowing up of all the locks at Sault Ste. Marie [there are now three, with a fourth building], it would take only about ten good train loads of ore from Lake Superior mines to provide for the wants of the proposed armor-plate factory for an entire year, to say nothing of the millions of tons of ore that are carried in reserve in furnace yards and on Lake Erie docks. But, of course, while the hysteria is on, one must think of the possibility of all the railroads leading from Lake Superior to Central Western furnaces being blown up by bombs from enemy aeroplanes, and of every railroad and blast furnace and steel plant in the South being entirely exempt from any such visitation. There are some reasons for building an armor-plate plant in the South and for the establishment of munitions manufacture there, but those who ask serious consideration for them will want to separate them from this rubbish of putting the rest of the country's steel works out of business by dynamiting the Soo canals.

Patriotism in the Steel Trade

As soon as the members of the National Guard of the various States were called upon for possible service against Mexico, announcements began to appear from employers of all kinds that their employees enlisting for army service would be continued on payrolls, and that their positions would be open for them on their return. Such announcements from steel and iron manufacturers began to come to this office and would have been made the subject of special mention if they had not become so numerous that the publication of the list would be almost a roster of iron and steel establishments in this country. Such organizations as the Employers' Association of the Mahoning Valley, with headquarters at Youngstown, Ohio, have recommended to their members that they continue on their payrolls, at least until Jan. 1, 1917, all employees enlisting for service in the army. Action of this character cannot fail to hearten those employees who had already become members of the National Guard and to induce others to enlist. It speaks well for the patriotism of employers to find that they recognize the services of their men in this substantial manner. Undoubtedly the country has been awakened by the preparedness movement, which is now bearing fruit in unexpected ways.

New Kinds of Steel

Since the war got well started there have been from time to time decidedly tantalizing reports of new steel developed by the belligerents. Just about enough is told to arouse the interest of the hearer. Germany, it is reported, has a steel that requires little if any ferromanganese in the manufacture, as well as several varieties of shell-steel which upon mere analysis would hardly be regarded as of shell quality. In England a high-speed steel has been developed which is rather tryingly described as containing neither tungsten, molybdenum, cobalt, nor vanadium, while one is not told what it does contain.

The circumstances are such as to develop important progress of which the American steel trade cannot secure details. All the belligerents are anxious to have better steel, for shell and other use, while on account of the scarcity or high price of alloy metals they are strongly disposed to find new ways of producing the quality desired. Thus they are undoubtedly making unusually rapid progress. In ordinary times there is means for a fairly free interchange of information. In the present circumstances the physical means are largely lacking, while for fear of valuable information falling into the hands of the enemy the belligerents are extremely secretive.

At the close of the war American steel manu-

facturers may find themselves confronted with embarrassing conditions on account of these developments. Steel that is good for war is good for the arts of peace. Every effort should be made to obtain all the information possible in these days of "war secrets." Some of the discoveries lately reported may turn out to be fabrications designed to cheer the country of origin or intimidate the enemy, but it can hardly be doubted that some of the results secured are of great importance.

Sliding Scale Steel-Works Wages

One of the numerous causes of the great Homestead strike of nearly a quarter century ago was a demand upon the part of the mill management that the limit price on steel billets be reduced. There was a sliding scale, rates varying according to the market price of billets, but the base rates of the scale applied when billets were $25, and if billets declined below $25 the wage rates were to remain at the base. Nearly a year before the existing scale was to terminate billets had broken through the $25 line, and at the time of the scale negotiations they were considerably below the limit, with prospects of going still lower.

In recent years the sheet and tin-plate wage scales of the Amalgamated Association have been sliding in principle but substantially fixed in practice, because the base prices fixed for the governing commodities were so high. By the rearrangement made somewhat more than a year ago the base prices were reduced, and since then the markets have advanced sharply, with the result that in the past six months the union sheet and tin-plate wage scales have been sliding in reality. The men have profited in the successively higher average prices obtained by the mills for their shipments.

As a result of this condition, renewals of the sheet and tin-plate wage scales for the year beginning next month were secured from the Amalgamated Association by practically inconsequential advances in the governing scales. The principle involved is somewhat complicated, and it is sufficient to say that the advances, comparing the expiring scale with the incoming scale, are about 3 per cent in the sheet mills and about 4 per cent in the tin mills, at a time when wages in general have been advancing rather sharply. Increased earnings have been automatically given the men through the sliding feature of the scales, so that the readjustment in the scales themselves, to satisfy interested parties, have been very small.

The wages of puddlers and other iron mill workers have fluctuated for years according to prices received for bar iron, the system apparently working to the satisfaction of all concerned. In many of the non-union mills there are periodic readjustments of wages, in accordance with prices realized upon the product made, while in some mills there is an annual bonus distribution, if profits warrant.

One reason why wages under the Amalgamated Association scales have not varied more in the past is that in the annual scale negotiations the discussions have been complicated and the case resolved itself into one of securing any kind of a bargain that could be made. A high basis rate for the governing commodity would be traded off for concessions in some other direction, and thus the principle of a sliding scale that should really slide was usually given up for a form so constructed that no sliding occurred.

The time seems to be particularly appropriate for a more general adoption of the principle of wages varying according to the price realized for the commodity made. Prices in the steel industry in the next few years are likely to fluctuate widely. A widely fluctuating market may be unfortunate, but when the fluctuations do occur they may as well be recognized. The manufacturer should share his prosperity and the workmen should help the manufacturer when the sharing is not of prosperity. The argument sometimes offered by workmen, that wage concessions to manufacturers are merely given away when the product comes to be sold, is not of much force, since in all cases the variation in wage rates is but a fraction of the variation in the selling price. In a price reduction the manufacturer always loses much more than the workman.

Rapid Growth in Tin-Plate Uses

The production of tin plates in the United States this year promises to reach a total far in advance of any record. Previous to 1915, in which the estimated output was about 1,000,000 gross tons, the high point was reached in 1912 at 962,971 gross tons. Estimates from good sources range from 1,200,000 to 1,250,000 gross tons for 1916. A factor to which attention has already been called is the great increase in our exports due to the cutting off of exports from Great Britain. There is also operative, as has been the case for the past two or three years, a very marked increase in the use of tin plates in the manufacture of containers for a wide variety of products, including articles of general consumption sold in retail stores; and the growth of the tin-plate tonnage in other manufacturing and service lines is illustrated in the gasoline trade for automobiles. We printed the statement some time ago that about 20,000 tons of tin plate was consumed each year for bottle caps, as an example of some unconsidered factors that go into the total. The preference for tin plate over wood or pasteboard packages has grown very rapidly in many lines of manufacture and trade.

A Confession of Weakness

The House of Representatives blundered last week when it refused to allow Government employees to decide for themselves whether they care to work under scientific management. The representative from the district containing the Watertown arsenal, if we mistake not, offered an amendment to the anti-time-study and anti-bonus-payment rider to the fortifications appropriation bill. It provided that by referendum workers in Government shops in a given locality might indicate their preference. Labor's argument against the use of the tools of efficiency has been based largely on experiences in the shops at Watertown; yet the House determined that the workmen should have no voice in the conditions of employment, the amendment was voted down and the rider unamended was passed. While the union fights for collective bargaining, its leaders assume to know

what is best for the individuals; at least, they are not going to allow the individual, even though he belong to the majority, to make a mistake. The majority of the members of the House take their stand in this as in some other matters along with the labor leaders, for reasons that are not obscure.

It is confession of a weak and unjust cause that congressmen fear to leave to local shopmen the question of the system under which they shall work. It points to the same sort of coercion that the labor unions have used in Congress on other occasions. The one hopeful feature is that all this pressure for legislation antagonistic to efficiency will have a reaction in a more rapid spread of modern management ideas than would otherwise have been possible.

CORRESPONDENCE

Trained Congressmen

To the Editor: The fact that the House of Representatives has voted to forbid the employment of scientific shop management systems in the Government service should surprise no one. Those who followed the history of the notorious Pearre measure, for example, are aware how easily proposals of this character get to the point where they become an actual legislative menace.

One thing of vital importance, however, has certainly been established. It is useless to spend further time or energy in attempting to train our Congressmen in industrial economics. What we need is Congressmen who already have the training. That means that the business man himself, be he manufacturer, banker or dealer, must be willing to sit in Washington and take a part in framing legislation. As the House is constituted at present, there is very little representation left for business after lawyers and labor unionists are deducted. It is time that the figures were reversed.

H. D. MURPHY.

Jersey City, June 26, 1916.

Japan's Iron-Industry Commission

The Iron-Industry Investigation Commission of Japan was authorized by the government on May 7 to conduct investigations as to the possible sources of ore and to devise plans for their acquisition. Other important matters to be looked into, according to Vice-Consul M. D. Kirjassoff of Yokohama, Japan, are the sorts of material the country most urgently needs and should try to produce first, measures for eradicating the clash of interests between government-owned and private enterprises and the means of accelerating the development of Japan's iron industry, because of its dependence on outside countries for iron and steel.

Trade Acceptances and Cash Discount

At the meeting of the committee of the iron, steel and electrical trades in connection with the convention of the National Association of Credit Men, held in Pittsburgh recently, it developed that some members of the committee were in favor of retaining the cash discount even if trade acceptances were adopted, while others were in favor of eliminating it. The question as to whether the cash discount should or should not be continued in case trade acceptances are adopted is one of the questions that the committee intends to work out prior to the next meeting of the Credit Association.

The building of a number of new blast furnaces at Sagunto, Spain, is under consideration. It is reported that the Campania Minera de Sierra Menera will form an affiliated company with a capital of $4,000,000 for that purpose.

New Sheet and Tin-Plate Scales

As briefly noted on page 1531 of THE IRON AGE of June 22, the sheet and tin mill wage rates for the mills that sign the Amalgamated Association scale were settled last week at Atlantic City, N. J., for the year starting July 1. The old sheet-mill scale was based on the selling price of sheets at $2.25 per 100 lb. on Nos. 26, 27 and 28, but the new scale has reduced this figure to $2.15. The memorandum of agreement for the sheet-mill scale is as follows:

It is agreed that when the actual average invoiced selling price of 26, 27 and 28 gage plain sheet steel, f.o.b. mill, is $2.15 per 100 lb. the tonnage rate shall be as below, with 1½ per cent increase for each member of the crew for each 5c. per 100 lb. advance above the said $2.15 selling price, and 1½ per cent decrease for each member of the crew for each 5c. per 100 lb. decline in selling price to $1.80 selling price per ton of 2240 lb.

The tonnage rates are the same as in the 1915-16 scale. Some changes were made in the foot notes. No. 2 was changed to read:

No. 18 gage and lighter, over 32 in. wide, worked from slabs on sheet or jobbing mills, 8 per cent extra when run over and annealed in open furnace; and for all bars and crop ends from bars and plates to be worked into 16 gage and lighter that are not cut to proper lengths and have to be spread on sheet or jobbing mills, 5 per cent extra.

No. 5 was changed to read:

For pickle finish or pickled in rough, either iron or steel, worked on sheet or jobbing mills, 13 per cent extra shall be paid for the same except shearman, up to and including 22 gage, and 19 per cent for lighter gages.

No. 7 was changed to read:

Sheet or jobbing mills working three turns, the shearing shall be divided between two shearmen on jaw, crocodile or rotary shears and no shearman be allowed to shear more than two turns on jaw or crocodile shears, the maximum not to exceed three turns on squaring shears.

No. 9 was changed to read:

That the rollers on sheet or jobbing mills shall not be permitted to hold more than one turn.

It was agreed that extra help on sheet mills shall be furnished as follows:

Two men on 36-in. wide and over containing 22 sq. ft. or more, doubled.

Two men on 55-lb. bar and heavier any width doubled.

Two men on 75-lb. bar and heavier any width worked in pairs.

One man on 36-in. wide and over containing 22 sq. ft. or more, not doubled.

One man on 55-lb. bar and heavier any width not doubled.

For the purpose of arriving at the average selling price referred to in the preamble of the sheet-mill scale, it is agreed that all manufacturers represented at this conference will report all shipments of Nos. 26, 27 and 28 gages plain sheet steel f.o.b. mill each 60-day period.

In the tin-mill scale the former minimum of $3.50 remains, the memorandum of agreement being as follows:

It is agreed that when the actual average invoiced selling price of a box of 100 lb. of coke tin plate prime sheets is $3.50 f.o.b. mill, the tonnage rate shall be as below with a 1 per cent increase for each member of the crew on each 5c. advance in the price per box, and 1 per cent decrease for each member of the crew on each 5c. decrease down to a $3.20 selling price.

Wage rates in hot tin mills were advanced about 4 per cent over the present scale, apportioned 5 per cent each for catcher and screw boy, balance of advance, to make the total of 4 per cent, to be divided by equal percentages among the remainder of the crew.

The new Amalgamated scales, effective for a year starting July 1, for sheet and tin-plate mills, were signed in conference so that there will be no shutdown July 1, except for repairs that are usually made at that time.

The International Association of Machinists is this week holding its fifteenth annual convention in Baltimore, Md.

STEPS IN TARIFF REVISION

Plans Already in the Making Concern the Steel Trade—Imports the Largest in Our History

WASHINGTON, D. C., June 27, 1916.—That the tariff is to be forced to the front as an issue of paramount importance in the coming campaign and that plans are already being formulated for the immediate revision of the Underwood-Simmons act along protective lines in the event of a change of administration in November, are interesting developments of the past week. Whether, as believed in some quarters, the termination of the European war will be followed by a deluge of cheap goods or not, there can be no doubt that the resumption of business by four such important manufacturing countries as England, France, Germany and Belgium will increase materially our imports with our present low tariff barrier, and it is equally certain that the end of the war will witness a tremendous shrinkage in our exports that will cause our favorable trade balance to melt like snow in April sunshine.

Judge Gary's remarks at the recent meeting of the American Iron and Steel Institute in New York made a deep impression on a number of members of Congress and they will make a thorough investigation of the iron and steel industry with reference to its tariff requirements.

IMPORTS THE LARGEST IN OUR HISTORY

Notwithstanding the amount of publicity given to current statistics of our foreign trade only a comparatively few persons seem to be aware of the fact that our current imports are the largest in the history of the country. For the ten months ended April 30, 1916, they exceeded $1,722,000,000, a gain of nearly $350,000,000 over the same period of 1915 and of $150,000,000 over the record figures for the ten months of 1914, a period that included the seven months immediately following the passage of the Underwood-Simmons act. While there has been a gain in customs revenues during the present fiscal year as compared with 1915, the average ad valorem rate collected on current importations has been so low—approximating 9 per cent as compared with 20 per cent under the Payne-Aldrich law and 25 per cent under the Dingley act—that the customs receipts for the current year will be materially smaller than in 1912.

Considering the enormous special appropriations for the national defense now in contemplation and the condition of the treasury, which for the current year shows a deficit of more than $31,000,000, notwithstanding that the sugar duty and the emergency war revenue act—two revenue sources not counted upon by the framers of the Underwood-Simmons act—have turned a golden tide into the public coffers at the rate of $150,000,000 per annum, it is not surprising that those who are as strongly opposed to the revenue producing expedients to be utilized in the omnibus revenue bill now being prepared by the Ways and Means Committee as they are to the so-called "competitive tariff" principles upon which the existing tariff law is based, should be planning the wholesale revision of the tariff schedules.

That no dumping clause acceptable to the present majority in Congress can adequately protect American industries is the firm conviction of a number of members of the Ways and Means and Finance committees. However handicapped manufacturers in the warring countries of Europe may find themselves when hostilities cease, it is already apparent that commercial alliances are being formed that will introduce a new element in competition and that will make it necessary for the United States to provide additional tariff barriers unless it is prepared to sacrific material interests to an altruistic, not to say fantastic, ideal of "world service."

THE TARIFF COMMISSION

The interesting question arises as to the rôle to be played in these legislative preparations by the Tariff Commission provided for in the pending omnibus revenue bill. It is argued by friends of the administration that their opponents will be forced to await the organization of the commission and to permit it to make extended investigations of the industries affected by the various schedules of the Underwood-Simmons act before any steps whatever can be taken looking to tariff revision. It is understood that the Tariff Commission will be appointed very soon after the passage of the omnibus revenue bill in order that its members may be confirmed by the Senate at the present session. This will give the commission six or eight months in which to make investigations and prepare data for the use of the Ways and Means Committee at the special session next spring, should one be held.

W. L. C.

Dominion Steel Corporation's Meeting

The annual meeting of the shareholders of the Dominion Steel Corporation was held last week at Montreal. Mark Workman, the president, said that a fair market may be expected for some time to come. It would also seem that there should be a very urgent domestic need for all our products. This demand may come either immediately after the war, or, should the war continue for any length of time, it may be expected in the near future. Recent operations at Sydney, N. S., have demonstrated to my satisfaction that the quality of our steel is excellent, and fully capable of meeting the most exacting specifications. As regards the matter of finances our profit and loss account and balance sheet are now before you, and it is not necessary for me to go very deeply into this phase of our operations at the present time. He called attention to the gratifying increase in net earnings, and in the balance carried forward, as compared with the previous year, also to the complete liquidation of indebtedness to the banks which, with the payment of notes, means a saving of at least $250,000 in annual interest charges. He continued:

"Since my election to the presidency, I have been studying very closely the general efficiency of the whole organization and equipment of your properties, with a view to reducing operation costs, so as to enable us to successfully compete in the world's markets after the war is over. I find that your coal properties are in excellent condition, well equipped, and, I am informed, are equal in all respects to any on the continent. As to the steel plant I find, however, that some of the equipment will require considerable improvement before the greatest possible production and the lowest possible costs can be obtained. It will therefore be my policy to improve present conditions, and this subject will receive most careful study and consideration. As the first step in this direction, I have authorized the remodeling of two of the older blast furnaces on the most approved modern lines. Following these improvements the other units of the works will be taken up in order. My policy is to proceed with such improvements as soon as the company's earnings will permit, but results, of course, cannot be expected for some time, as it will take a considerable period before their full effect will be shown."

The Wellston Iron Furnace Company has been incorporated with $500,000 capital to take over the two blast furnaces of the Wellston Steel & Iron Company, at Wellston, Ohio, which were recently acquired at receivers' sale by S. E. Sternberger. The officers are the following: President, M. L. Sternberger, Jr.; vice-president and general manager, S. E. Sternberger; secretary, Joseph McGhee; general superintendent, J. G. Harding. It is the intention to start the larger stack about Aug. 1.

The Saxon Motor Company, Detroit, Mich., will erect a large automobile plant on a 38-acre site recently purchased in that city. The company is having plans made with a view of providing a factory of large capacity, and expects to spend about $1,000,000 this year in its building program. Horace H. Lane, industrial engineer, Detroit, is preparing the plans.

Scientific Management a Campaign Issue

Tavenner Amendment Goes Through at the Behest of Organized Labor—A Blow to Industrial Preparedness at a Critical Time

WASHINGTON, D. C., June 27, 1916.—With the tacit consent of the President of the United States, scientific shop management has been made a campaign issue. The so-called Tavenner amendment prohibiting the use of the stop-watch and time studies and the payment to employees of premiums for increased output in Government establishments will be incorporated in at least five great budget measures, the army, navy, fortifications, sundry civil and post-office appropriation bills, by the votes of the majority in both Houses. This legislation, so antagonistic to the interests of the Government and so fraught with danger, in view of the threat of war which now confronts the country, is understood to involve the tentative promise from labor leaders of the support of organized labor in the coming campaign. At the behest of the demagogue the Government of the United States is to abandon in all its departments up-to-date scientific manufacturing methods at a time when they are more necessary to the welfare of the country than for half a century.

Developments in the controversy over the use of scientific management systems in Government establishments have followed each other with great rapidity during the past week. After the passage by the House of the naval bill, to which the Tavenner amendment was added in committee and retained on the floor, a record vote was forced upon the same amendment when offered as a provision of the fortifications appropriation bill. This bill was framed by a sub-committee of the House Committee on Appropriations, which had rejected the amendment. During the consideration of the bill in committee of the whole the Tavenner provision was added by an informal vote, but the real fight came when the bill was taken up for final passage in the full House.

MANUFACTURERS REMIND THE PRESIDENT OF THE NEED OF EFFICIENCY NOW

It having been determined that the vote on this measure would be taken on Thursday, June 22, a delegation of well-known manufacturers, engineers and other business men succeeded, through the courtesy of the Secretary of War, in making an appointment with President Wilson to seek his co-operation in bringing about the defeat of the Tavenner amendment. This delegation included the following: Morris L. Cooke, chairman; Wilfred Lewis and D. Kirschbaum, Philadelphia; W. B. Richards, F. J. Miller, Howard E. Coffin and F. B. Copley, New York; E. B. Passano, Baltimore, Md.; Allen M. Cook, Norfolk, Va.; John Driscoll, Watertown, Mass.; H. P. Kendall, Norwood, Mass.; W. R. Whitney, Schenectady, N. Y.; J. L. Sydnor, Akron, Ohio; H. D. Minich, Boston; C. Wood Walter and E. A. Muller, Cincinnati, Ohio; W. A. Viall, Providence, R. I.; J. Utz and H. A. Goddard, Cleveland, Ohio; Donald Tulloch, Worcester, Mass.; F. C. Lawton and Boyd Fisher, Detroit, Mich.; H. H. Rice, Indianapolis, Ind., and Oberlin Smith, Bridgeton, N. J.

Mr. Cooke, as chairman of the delegation, presented the matter to the President briefly, his remarks being supplemented by short statements by other members of the party. Emphasizing the great emergency now confronting the country, Mr. Cooke told the President that scientific shop management was absolutely essential for real industrial preparedness. The stop-watch, the time study and the premium system, he said, were important factors in the system, which as a whole operated quite as effectively in the interest of the workman as of the establishment in which he was employed. The President, who, on numerous occasions before he was elected to his present office, in public utterances gave evidence of a very clear understanding of the unreasonableness of many of the demands of organized labor, listened attentively to Mr. Cooke and his associates and then inquired whether the delegation had called upon the Congressional leaders. Upon being informed that, aside from the statements made before the House Committee on Labor, no attempt had been made to reach members of the House directly, the President earnestly urged the delegation to go at once to the Capitol and see the chairmen of the leading committees.

In accordance with this suggestion calls were at once made upon Chairman Kitchin, the majority leader, and the heads of the principal House committees. Mr. Kitchin received Mr. Cooke and his colleagues very cordially, announced his intention of voting against the Tavenner amendment, and upon learning that the delegation had visited the House at the President's suggestion, expressed the opinion that the obnoxious provision would be signally defeated in both Houses if the President would intimate to the Congressional leaders that he was personally opposed to it. Both surprised and gratified at Mr. Kitchin's assurance, the delegation immediately addressed a letter to the President advising him of what Mr. Kitchin had said and urging him to act promptly in view of the fact that the fortifications bill would be taken up on the following day. As a matter of additional precaution a copy of the letter to the President was also transmitted to Secretary of War Baker with an expression of the hope that, as the fortifications bill would soon be acted on, the Secretary would regard the subject as of sufficient importance to warrant him in bringing the delegation's letter to the attention of the President before the vote was taken.

However, the President did not act upon Mr. Kitchin's suggestion and when the vote on the fortifications bill was taken June 22 the Tavenner amendment was incorporated therein, 197 members voting yea, 117 nay, 14 answering "present," while 106 were recorded as absent and not voting. The Tavenner amendment was then added to the sundry civil appropriation bill and to the army bill without the formality of a roll call.

ANTI-SCIENTIFIC MANAGEMENT AMENDMENTS FOR FIVE BUDGET BILLS

The word has now gone forth that the prohibition of scientific shop management shall be included in the five budget bills referred to as those measures are finally passed. Notwithstanding the fact that the Secretary of War and the Postmaster-General have indicated their opposition to the Tavenner provision, political considerations are to outweigh all others. The Senate to-day took up the sundry civil bill to which the House added the Tavenner amendment, and passed the measure at a late hour. The post-office, naval, fortifications and army bills will be taken up in order and the anti-scientific management amendment voted into each.

In adding the Tavenner amendment to the naval bill Congress will completely stultify itself. While prohibiting the payment of premiums or cash rewards to employees of the Government working in the arsenals, the bill carries huge sums to pay cash rewards for efficiency in gunnery and marksmanship and to builders of naval vessels for efficiency and promptness in their construction. An indefinite sum is appropriated "for prizes, trophies and badges for excellence in gunnery exercises and target practice" of both enlisted men and the naval militia, while the sum of $3,000 is specifically allotted for prizes, trophies and badges for "excellence in steaming exercises," to be awarded to the ships in commission for general efficiency and for economy in coal consumption. A distinguished naval officer is authority for the statement that in training gun crews under the stimulus of the prizes provided by Congress the stop-watch and time study are frequently em-

ployed; in fact, are indispensable to the acquisition of the highest skill in this important feature of naval practice. The bill also authorizes the Secretary of the Navy to pay premiums over and above the contract price, not to exceed 20 per centum thereof, for the most expeditious delivery of the warships authorized. This provision is an excellent example of the gross inconsistency and unfairness of the prohibition against the payment of a cash reward or bonus. W. L. C.

BRITISH STEEL EXPORTS

May the Largest War Month—Pig-Iron Shipments a Record

May exports of British iron and steel, excluding iron ore and including scrap, were 395,750 gross tons, the largest of any month since the war started. The largest previous month was 351,984 tons in July, 1915, with November, 1915, next at 308,219 tons. This is an unexpected showing in the face of the April government order prohibiting exports. April exports were 293,897 tons, and the 1915 average was 270,858 tons. The May increases represent exports to war allies.

Pig-iron exports in May were 83,839 tons, the largest since the war began. The average in the four previous months was 72,678 tons. Of the May shipments France took 57,741 tons and Italy 11,244 tons. To June 1, 1916, the total was 374,553 tons against only 99,505 tons to June 1, 1915. Of the former total France has taken 217,209 tons and Italy 74,978 tons.

Steel-bar exports in May were 80,205 tons, of which 69,444 tons went to France. To June 1, 1916, the total was 302,178 tons, France taking 255,172 tons of this, against 185,575 tons to June 1, 1915. Ferromanganese exports in May were about 14,000 tons against 11,000 in April. For the first five months they were 56,000 tons against 28,000 tons to June 1, 1915, showing growing liberality in releasing the alloy.

Rail exports in May were only 4103 tons against 21,776 tons in May, 1915. The galvanized sheet movement is about 50 per cent of what it was a year ago or 16,526 tons in May against 31,527 tons in May, 1915. Tin-plate exports about hold their own. In May they were 41,868 tons against 33,727 tons in May, 1915. To June 1, 1916, they were 158,247 tons against 164,349 tons to June 1, 1915.

May imports of iron and steel, excluding iron ore and including scrap, were 89,089 tons, the largest this year, the average to May 1, 1916, having been 75,926 tons per month. They are still below the monthly average of 107,944 tons for 1915. Imports of blooms, billets and slabs in May were 18,124 tons of which 12,439 tons went from the United States. To June 1, 1916, the total was 64,773 tons (50,021 tons from the United States) against 142,407 tons to May 1, 1915.

California Shipbuilding Extension

The Union Iron Works Company, shipbuilder, San Francisco, Cal., is negotiating with the city of Alameda, Cal., for water-front property, upon which it proposes to erect what is stated by one of the company officials is to be one of the largest shipbuilding plants in the country. The site in question has a frontage of about 1000 ft. and adjoins the Union Iron Works. The company plans to spend $500,000 in improvements at once, if it can be leased. In case this property cannot be obtained, its holdings at Hunters Point will be developed. Ways for five vessels are now being planned. By next September at least 2000 men will be given employment at the local plant. At its San Francisco works 4920 men are being employed with a weekly payroll of about $125,000. Joseph J. Tynan, vice-president and general manager, is conducting the negotiations.

Donahue Steel Products Company, western representative of the Automatic Transportation Company, manufacturer of storage battery industrial trucks, has moved its offices from the First National Bank Building, Chicago, to the Peoples Gas Building of that city.

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TESTING MATERIALS MEETING

Annual Gathering of American Society for Testing Materials at Atlantic City

ATLANTIC CITY, N. J., June 27, 1916.—(*By Telegraph.*)—The standard specifications of the American Society for Testing Materials will hereafter be published biennially, instead of yearly, in accordance with the plan and for the reasons stated below. The society opened its annual meeting here this morning and voted to submit to the membership for a mail ballot the necessary changes to the by-laws. Such approval is all that remains to put the plan into effect.

For the first time in the society's history, a producer has been elected president. The new official head, A. A. Stevenson, in an informal address, urged that his selection was indicative solely of the cordial relations between consumer and producer, adding that in the last analysis there should be such relations, as the interests are common. "I hope," said he, "I shall so conduct affairs that the thought whether I am a consumer or producer will not enter the minds of anyone."

A. A. STEVENSON, THE NEW PRESIDENT

The support given to export trade by the Department of Commerce in translating the society's specifications into foreign languages was emphasized by Dr. Edgar Marburg, the secretary of the society, as the first Government aid to a kind of work which in Great Britain was done in granting subsidies to the Engineering Standards Committee.

Mansfield Merriman, in his address as outgoing president, dwelt on the work of committees of the society resulting in standards which, he said, represent a harmony of the interests concerned, are favorably known abroad and will be of great benefit to industry in the United States.

The annual report of the executive committee told of the plan to publish the standards, or specifications, of the society every two years, in the even years, and of the plans of the United States Department of Commerce to translate into foreign languages some of the standards of the society, and discussed the considerably brighter prospect of the society in a financial way.

YEAR-BOOK EVERY OTHER YEAR

The move to bring out the year-book of standards every other year is in part an answer to the criticism that the standards are subject to too frequent changes and thus this publication is desirable from the standpoint of the users of the standards and also because of the arrangement for the Department of Commerce to issue the standards in foreign languages. As has already been noted in these columns, the standards thus translated are to be distributed through the consular officers, free of cost and without expense to the society, but will be available to American manufacturers and others at moderate prices.

SPECIFICATIONS IN SPANISH SOON AVAILABLE

It appears that quite a number of the standards have already been translated into Spanish and will be ready for the printer as soon as any changes authorized at the annual meeting are known. These include specifications for rails, structural steel, springs, forgings, wheels, tires, steel castings, tubes, boiler and fire-box steels and cast-iron pipe and special castings. The funds available up to July 1 for translating apply only to the development of South American trade and the question of putting the specifications into Portuguese and Russian has been left open for the present.

The total membership of the society is about 2071 and the net increase in membership for the year is 229, compared with 155 for the previous year, and a net average annual increase of 112 for the preceding five years. This record is made in spite of the fact that on the first of the year dues were increased 50 per cent. As to the finances, the report indicates that there will be a moderate surplus by the end of the year and that the financial affairs of the society will then be on a thoroughly sound business basis for the first time in the history of the organization. The report shows also that the receipts from six different institutions, including the Carnegie Steel Company, the Illinois Steel Company and the National Tube Company for the right to print the specifications of the society amounted to $1,050.

It appears that the issuing of a monthly or bimonthly journal has been under consideration, but definite decision is withheld, pending improvement in the financial condition of the society. It should be noted that under the plan of publishing the year-book only in even years, new or proposed amendments to existing standards offered in the interval are to be published in the Proceedings in a section devoted to tentative standards.

The committee on hardness tests has been discontinued and merged with the committee on methods of testing, and the study of metallic coatings for metals has been referred to the committee on corrosion of iron and steel.

Of the reports of different standing committees, which were presented on Tuesday, mention may be made of the following:

The committee on wrought iron, S. V. Hunnings, chemist and engineer of tests, American Locomotive Company, Schenectady, N. Y., chairman, has submitted a new table of standard minimum weights for the society's existing specifications on lap-welded iron boiler tubes. The table contains a number of changes to make it harmonize with the table included in the standard specification for steel tubes, the weights of the iron tubes being properly 2 per cent less than the weights of the steel tubes for the corresponding diameters and gages.

PERILLA OIL FOR CORES

The report of the Committee D-1, on preservative coatings for structural materials, included a report on perilla oil pressed from perilla seeds. According to H. A. Gardner, assistant director Institute of Industrial Research, Washington, D. C., some experiments were made by C. T. Bragg, chemical engineer for the Ohio Brass Company, Mansfield, Ohio, indicating that perilla oil is excellent as a substitute for linseed oil for the manufacture of high-grade cores in foundry work. A sub-committee report made by A. W. Carpenter, assistant valuation engineer, New York Central Railroad, recommends a series of panel tests to demonstrate, if possible, the relative merits of the different methods of preparing iron and steel surfaces for painting, such as pickling, sand blasting, etc., and the effect of extremes of atmosphere and temperature conditions during painting. The committee prepared a program for such a series of tests.

OFFICERS ELECTED

The officers elected are as follows:

President, A. A. Stevenson, vice-president Standard Steel Works Company, Philadelphia.

Vice-president to serve two years, S. S. Voorhees, engineer-chemist, Bureau of Standards, Washington, D. C.

Members of the executive committee: W. H. Bassett, chemist, American Brass Company, Waterbury, Conn.; John Brunner, assistant inspecting engineer, Illinois Steel Company, Chicago; G. W. Thompson, chemist, National Lead Company, Brooklyn, N. Y., and F. E. Turneaure, dean of college of mechanics and engineering, University of Wisconsin, Madison, Wis.

Archibald A. Stevenson

Archibald Alston Stevenson, who was elected president of the American Society for Testing Materials, as announced at the annual meeting of that society at Atlantic City, June 27, entered the employ of the Standard Steel Works Aug. 1, 1888, as engineer, became superintendent Jan. 1, 1903, since July, 1908, he has been vice-president. He was born at Allegheny City, Pa., April 10, 1862, and was graduated from Rock Island, Ill., high school in 1878. After one year in Government survey work on the Mississippi River as rodman, two years at the University of Illinois, over four years in the drafting room of the Southwark Foundry & Machine Company of Philadelphia, the last year in charge of the drafting room; he spent over two years with the Cambria Iron Company, part of the time in the chief engineer's office, and the remainder as foreman of the forge and axle plant. He was vice-president of the Association of American Steel Manufacturers from 1908 to 1911, and president from 1911 to 1914. He is a member of the American Society of Mechanical Engineers and the American Institute of Mining Engineers, and also of the International Association for Testing Materials.

Unused Water-Power Development Urged

The Joint Conference Committee of National Engineering Societies, 220 West Fifty-seventh Street, New York, of which Calvert Townley is chairman and Charles W. Hunt, secretary, has sent to President Wilson a copy of a resolution adopted by the committee at its meeting held June 15, as follows:

> The Joint Conference Committee of National Engineering Societies believes that the development of the country's undeveloped water power will increase national prosperity; that private enterprise should be encouraged and stimulated to expedite such development; that unnecessary legal burdens should be removed and existing doubts as to the safety of investment eliminated. It commends to the support of engineers all efforts made to secure the fullest publicity as to the underlying facts regarding this subject.

The societies by which this committee was constituted are the American Society of Civil Engineers, American Institute of Mining Engineers, American Society of Mechanical Engineers and American Institute of Electrical Engineers. Therefore it speaks in the name of about 30,000 engineers.

Complete shells will be manufactured in the Process Building at the Toronto Exhibition, Canada, this year. Negotiations have been under way for some time between the exhibition management and the Canadian Government with this end in view, and the consent of the Department of Militia has been given for an exposition of the methods employed in turning out munitions for the Allies, from the rough forging to the finished article.

An electric furnace for making graphite has been invented by John W. Brown (U. S. 1,177,680—April 4, 1916) and assigned to the National Carbon Company of Cleveland, Ohio. It is a continuous furnace, the coke being fed into the top by a screw conveyor and removed at the bottom by the same means.

ENLARGED NAVAL PROGRAM

Three First-Class Battleships for Next Year and Ten in Five Years

WASHINGTON, D. C., June 27, 1916.—The advocates of adequate preparedness have won a notable victory in the Senate Committee on Naval Affairs, a subcommittee of which has completely recast the annual naval appropriation bill as passed by the House. Three dreadnoughts and four battle cruisers have been substituted for the five battle cruisers authorized by the House measure, and the five-year construction program, so carefully worked out by the experts of the Navy Department and contemptuously rejected by the House Naval Committee, has been incorporated in the bill. Another notable addition by the Senate committee is an increase of $5,000,000 in the appropriation for the manufacture of a reserve supply of ammunition for the navy.

The construction program authorized by the Senate committee for the coming year will include four dreadnoughts, four battle cruisers, four scout cruisers, ten torpedo-boat destroyers, thirty coast submarines, one fuel ship, one hospital ship and one ammunition ship.

The five-year building program worked out by the Navy Department and adopted by the Senate committee commits Congress to provide for the construction of the following vessels: Ten battleships, first class; six battle cruisers, ten scout cruisers, fifty torpedo-boat destroyers, fifteen fleet submarines, seventy-five coast submarines, one repair ship, one transport, one hospital ship, two destroyer tenders, one fleet submarine tender, two ammunition ships, four river gunboats and three fuel-oil ships. Under the terms of the Senate bill the ten first-class battleships (dreadnoughts) will carry as heavy armor and as powerful armament as any vessels of their class. They will be designed to develop the highest practicable speed and the greatest desirable radius of action and will cost, exclusive of armor and armament, not to exceed $11,500,000 each. Similar requirements are provided for the battle cruisers.

A hard fight is anticipated over the naval bill when it reaches the conference committee that will be appointed to harmonize the conflicting provisions of the House and Senate drafts. All the information upon which the Senate has acted, with the possible exception of the lesson deduced from the recent great naval battle between the British and German fleets, which demonstrated the high efficiency of the dreadnought, was before the House committee when the Navy Department's recommendations for dreadnoughts and for a five-year program of construction were decisively rejected. There has been a steady growth in sentiment for preparedness throughout the country, however, and the indications are that the Senate will be able to force very substantial concessions from the House.

W. L. C.

German Steel Shipments Small

Shipments of the German Steel Works Union in April were 271,756 metric tons, the lowest this year and only a little in excess of the average of 271,510 tons per month in 1915. The April shipments were made up as follows: Semi-finished steel, 83,132 tons; railroad material, 119,936 tons, and shapes, 68,688 tons. The shipments in April, 1915, were 306,115 tons. The total to May 1, 1916, was 1,152,000 tons against 1,180,000 tons to May 1, 1915.

The Manitowoc Shipbuilding & Dry Dock Company, Manitowoc, Wis., has launched the first of four steam fishing trawlers being constructed for the Bay State Fishing Company, Boston. They are 145 ft. over all, with 22 ft. 6 in. beam, and are fitted with steam engines of 450 hp., guaranteed to average 11 knots per hr. The launching marked the first construction of a salt water craft at the Manitowoc shipyards.

Iron and Steel Markets

GOVERNMENT WAR DEMAND

A Factor of Strength in the Market

Rail and Shell Steel Demand Still Large—Mesaba Miners' Strike More Serious

Because of the probability of early Government buying of steel products and munitions, the steel trade believes the outcome of the Mexican crisis will be more likely to help than to hurt the market. Some war products now being manufactured for foreign governments can be taken, as has already been arranged in the case of machine guns, but new home orders would no doubt be large. There is already some figuring in the trade on possible needs of railroad material for northern Mexico.

The crowding of the naval program into three years, instead of five, and the increase in the number of battleships may call for 175,000 tons of steel for the coming year instead of 150,000 tons.

New inquiries from Europe for Bessemer pig iron, steel billets and shell steel are in such volume as to indicate that foreign buyers appreciate the possibilities of a check on American shipments of finished munitions.

The week has brought more evidence of the extent to which new export business is sustaining prices in the home market in the face of a further decrease in domestic demand and the continued tendency of prices for early deliveries to approach those on contracts running months ahead. Chicago reports that new orders closed exceeded shipments, but there rails and other export steel were a large factor.

Export rail inquiries apart from the large tonnage for Russia are considerable, some of them being reappearances after the lapse of months. They include 10,000 tons for two Cuban roads, 3000 to 4000 tons for Portugal, 12,000 tons for France and two lots for South Africa and South America. A sale of 20,000 tons reported as to Great Britain may be identical with a transaction with Australia. On the South African inquiry $40 f.o.b. mill was quoted.

A Central Western manufacturer has bought 20,000 tons of light section rails, which will do service in France in portable tracks.

The recent closing by two large producers of several hundred thousand tons of shell steel is followed by intimations that France and Italy are yet to buy for the fourth and first quarters. New contracts both for steel and for finished shells have been attended with an unusual suppression of the facts. More cases came up, however, of firms completing shell contracts and having no renewals.

A good amount of steel bar business has been closed, including some for implement work. Bessemer bars are to be had for fairly prompt delivery at 2.50c. to 2.75c., Pittsburgh. Steel manufacturers being now able to turn their crude steel into the channels yielding the best profit are still refusing to give implement buyers preferential prices.

The cotton tie market has opened at $1.35 a bundle, July delivery, as against 85c. last year. For August delivery there is an advance of ¾c. per lb., or 33¾c. per bundle, and a like advance for September. This year's business is estimated at 14,000,000 bundles.

Plates show considerable variations in price, with Eastern mills holding the market more stiffly on early deliveries, little or no Bessemer material coming out in that section. Two 10,000-ton Lake ore boats have just been placed with the American Ship Building Company for delivery next year. The shipyard demand is very strong, but car work is not promising.

The Mesaba iron miners' strike has made some further headway. Though shipments are not yet affected, the union attempt to get out dock workers, if successful, would be serious. The possibilities of the strike, in affecting the whole market, are not ignored.

Export pig iron inquiry is heavy, but new sales are made slowly. It is not so certain that this demand will counterbalance the sagging tendencies of the domestic market.

Pittsburgh

PITTSBURGH, PA., June 27, 1916.

The grave situation between this country and Mexico is the chief topic of discussion in the steel trade. The consensus of opinion is that if war is declared the Government will quickly check shipments of ammunition and other steel products to the Allies, and conserve these for our own use. That this belief also prevails abroad is shown by the fact that new inquiries for Bessemer pig iron, steel billets, shell steel, barb wire and other products in the last few days have been exceedingly heavy, and there is a desire shown by agents representing foreign buyers to close up business as soon as possible, and get shipments started. One authority estimates that Italy alone has bought in this country recently 50,000 tons or more of Bessemer iron, much of this coming from Chicago, Ashland, Ky., and other pig-iron making centers. A good deal of Bessemer iron for Italy has been furnished by Valley furnaces, so much so that the supply has been pretty well cleaned up. Inquiries for Bessemer this week for shipment to Italy include two lots of 5000 tons each and one of 10,000 tons. The domestic demand for pig iron and steel is fairly active, but for finished material is dull. Consumers are pretty well covered over the remainder of this year, mills have specifications in hand for three or four months' work, and the months of July and August are likely to accentuate present dullness. There is some material yet to be bought for fourth quarter delivery, and for this reason a buying movement in September is expected. Prices show no important change, and there is no indication of advances

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	June 28, 1916.	June 21, 1916.	May 31, 1916.	June 30, 1915.
No. 2 X, Philadelphia	$19.75	$19.75	$20.50	$14.25
No. 2, Valley furnace	18.25	18.25	18.00	12.50
No. 2 Southern, Cin'ti	*16.90*	17.40	17.90	12.65
No. 2, Birmingham, Ala.	*14.00*	14.50	15.00	9.75
No. 2, furnace, Chicago*	19.00	19.00	19.00	13.00
Basic, del'd, eastern Pa.	19.50	19.50	20.50	13.75
Basic, Valley furnace	18.00	18.00	18.00	12.65
Bessemer, Pittsburgh	21.95	21.95	21.95	14.70
Malleable Bess., Ch'go*	19.50	19.50	19.50	13.00
Gray forge, Pittsburgh	18.70	18.70	18.70	13.35
L. S. charcoal, Chicago	19.75	19.75	19.75	15.75
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh	42.00	42.00	45.00	21.00
O.-h. billets, Pittsburgh	42.00	42.00	42.00	21.00
O.-h. sheet bars, P'gh	42.00	42.00	42.00	22.00
Forging billets, base, P'gh	69.00	69.00	69.00	27.00
O.-h. billets, Phila	50.00	50.00	50.00	22.02
Wire rods, Pittsburgh	*50.00*	55.00	60.00	25.00
Finished Iron and Steel, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy at mill	1.47½	1.47½	1.47½	1.25
O.-h. rails, heavy, at mill	1.56½	1.56½	1.56½	1.34
Iron bars, Philadelphia	2.659	2.659	2.659	1.22½
Iron bars, Pittsburgh	2.50	2.50	2.60	1.25
Iron bars, Chicago	2.35	2.35	2.35	1.20
Steel bars, Pittsburgh	2.75	2.75	3.00	1.25
Steel bars, New York	2.919	2.919	3.169	1.419
Tank plates, Pittsburgh	*3.25*	3.75	3.75	1.20
Tank plates, New York	*3.419*	3.919	3.919	1.369
Beams, etc., Pittsburgh	2.50	2.50	2.60	1.20
Beams, etc., New York	2.669	2.669	2.769	1.369
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.15
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.20
Steel hoops, Pittsburgh	2.75	2.75	2.75	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire. Per Lb. to Large Buyers:	June 28, 1916. Cents.	June 21, 1916. Cents.	May 31, 1916. Cents.	June 30, 1915. Cents.
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.75
Galv. sheets, No. 28, P'gh	4.60	4.60	4.75	4.50
Wire nails, Pittsburgh	2.50	2.50	2.50	1.55
Cut nails, Pittsburgh	2.60	2.60	2.60	1.55
Fence wire base, P'gh	2.45	2.45	2.45	1.35
Barb wire, galv., P'gh	3.35	3.35	3.35	2.40
Old Material, Per Gross Ton:				
Iron rails, Chicago	18.00	18.00	17.50	12.25
Iron rails, Philadelphia	20.00	20.00	20.00	15.00
Carwheels, Chicago	*12.00*	12.25	12.75	10.75
Carwheels, Philadelphia	*16.00*	16.50	16.50	11.50
Heavy steel scrap, P'gh	15.75	15.75	16.50	11.75
Heavy steel scrap, Phila.	*14.75*	15.00	16.00	11.25
Heavy steel scrap, Ch'go	*14.00*	14.50	15.50	9.75
No. 1 cast, Pittsburgh	15.75	15.75	16.00	12.25
No. 1 cast, Philadelphia	16.00	16.00	17.50	12.25
No. 1 cast, Ch'go (net ton)	11.50	11.50	12.00	9.00
Coke, Connellsville, Per Net Ton at Oven:				
Furnace coke, prompt	$2.40	$2.40	$2.50	$1.60
Furnace coke, future	2.50	2.50	2.50	1.75
Foundry coke, prompt	3.25	3.25	3.25	2.00
Foundry coke, future	3.50	3.50	3.25	2.25
Metals, Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	*27.75*	27.75	28.25	22.50
Electrolytic copper, N. Y.	*26.50*	27.00	28.00	20.00
Spelter, St. Louis	*11.50*	12.25	13.75	21.00
Spelter, New York	*11.75*	12.50	14.00	21.50
Lead, St. Louis	**6.65**	6.45	7.20	5.60
Lead, New York	**6.80**	6.62½	7.35	5.75
Tin, New York	*39.00*	40.75	46.75	40.00
Antimony, Asiatic, N. Y.	*17.50*	18.00	25.00	36.25
Tin plate, 100-lb. box, P'gh	**$6.00**	$5.75	$5.50	$3.10

in the near future. Coke is only fairly active for last half delivery, and the scrap trade is dull and neglected.

Pig Iron.—So far as known, the Colonial Steel Company has not closed on its inquiry for 10,000 tons of basic iron for last half delivery. The specifications for the iron were not attractive and some furnaces refused to quote on the inquiry. The sulphur requirement was 0.03 to 0.35 and there was also a special silicon and the limit in manganese was 1 to 1.25 per cent. It is probable that if bought the iron will bring a slightly higher price than is quoted for basic iron of standard analysis. Inquiries are in this market for 20,000 to 25,000 tons of Bessemer iron for export to Italy, but the available supply has been pretty well cleaned up. The demand for foundry iron for last half of the year is better, and we note a sale of 1500 tons of No. 2, equal deliveries July to December at $18.50, Valley furnace. We also note a sale of 500 tons of standard Bessemer iron for a domestic consumer at $21 at furnace. Prices are unchanged. We quote Bessemer iron at $21; basic, $18; gray forge, $17.75 to $18; No. 2 foundry, $18.25 to $18.50, and malleable Bessemer, $18.50 to $19, all at Valley furnace, the freight rate to the Pittsburgh or Cleveland district being 95c. per gross ton.

Ferroalloys.—Consumers of ferromanganese are evidently well covered for some time ahead and are not taking much interest in the market. New inquiry is quiet and prices are not very firm. Domestic 80 per cent ferromanganese is offered at $200, and possibly on a firm offer $175 could be done. Reports of a sale of 500 tons of domestic ferromanganese for last half delivery at $175 per ton are not confirmed. English 80 per cent remains at $175, seaboard, on contracts for next year's delivery, but with no guarantee as to shipment. We quote 18 to 22 per cent spiegeleisen at $50 to $55, and 25 to 35 per cent at $55 to $60 at furnace. We quote 50 per cent ferrosilicon at $85 for lots up to 100 tons; over 100 tons and up to 600 tons, $84, and over 600 tons, $83, all per gross ton, f.o.b. Pittsburgh. Prices of Bessemer ferrosilicon for delivery over remainder of the year are now quoted as follows: 9 per cent, $32; 10 per cent, $33; 11 per cent, $34; 12 per cent, $35; 13 per cent, $36.50; 14 per cent, $38.50; 15 per cent, $40.50, and 16 per cent, $43. Seven per cent silvery for the same delivery is $28.50; 8 per cent, $29; 9 per cent, $29.50; 10 per cent, $30; 11 per cent, $31, and 12 per cent, $32. All these prices are f.o.b. at furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., each of these points having a freight rate of $2 per gross ton to Pittsburgh.

Billets and Sheet Bars.—There is a heavy export demand for both Bessemer and open-hearth billets for quick shipment, and this has had the effect of making prices much firmer than they were two or three weeks ago. While it is possible that Bessemer billets might be obtained at $40, this is doubtful, most sellers asking $42 and some as high as $45. We note a sale of 100 tons of soft Bessemer billets at $42.50, Pittsburgh. While the supply of open-hearth steel is larger, the demand is heavier, and it is scarcer now than it was two or three weeks ago. One leading maker that has been a seller in the market for a month or more states that it has sold all the steel it cares to and has no more to offer. We quote soft open-hearth billets and sheet bars at $42 to $45; Bessemer billets, $40 to $42; and Bessemer sheet bars, $40 to $42, maker's mill, Pittsburgh or Youngstown district. We quote forging billets at $69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take $1 extra.

Plates.—The Pennsylvania Railroad is reported in the market for 15,000 to 20,000 tons of sheared plates for steel cars which it will build at its shops at Altoona. The Pressed Steel Car Company has received an order from the Havana Central Railroad for 200 box, 300 flat and 10 hopper cars, and the Standard Car Construction Company has given 100 tank cars to the same builder. The Western Steel Car & Foundry Company, a subsidiary of the Pressed Steel Car Company, has taken an order for 82 center constructions for Phelps, Dodge & Co., and the Pressed Steel Car Company is repairing 500 freight cars for the New York, Chicago & St. Louis Railroad, in which steel center sills will be installed. The general inquiry for cars is light, and it is said the steel car shops have very little work beyond August. The mill price on ¼-in. and heavier steel plates is 2.75c. for delivery in last quarter of this year and first quarter of

1917. For shipment in four to six weeks, one mill is quoting 3c. to 3.25c., and reports sales at the higher price. Other mills are quoting from 3c. to 4c. for fairly prompt delivery, prices depending on the size of the order and the delivery wanted.

Structural Material.—New inquiry in the past week has been more active than for some time. The Pennsylvania Railroad is reported in the market for 8000 to 10,000 tons of structural steel for bridge work on its lines east of Pittsburgh. The American Bridge Company has taken 5000 tons of steel for additions to an open-hearth steel plant at Cleveland, Ohio. Bids are to be opened on Friday, June 30, on 1000 tons for an addition to Mercy Hospital in this city. One maker is offering Bessemer steel shapes for delivery in four to six weeks at 2.50c., f.o.b. Pittsburgh. We quote beams and channels up to 15 in. at 2.50c. to 2.75c. at mill for delivery in third and fourth quarters, while small lots from stock are held at 3.25c. up to 4c., prices depending entirely on the size of the order and how soon deliveries are wanted.

Steel Rails.—On both standard sections and light rails, the Carnegie Steel Company is sold up into the third quarter of 1917. Very few new orders for standard sections are being placed, and the demand for light rails has fallen off. Rerolling rail mills are said to be getting the bulk of the new business, as they can buy old rails for rerolling at close to $16, and with a cost of $10 or less for putting them into lighter sections their margin of profit is large, even when they shade prices of new light rails $1 to $2 per ton or more, which they have been doing. Light rails are now quoted per gross ton instead of per lb., as formerly, and we quote: 25 to 45-lb. sections, $47; 16 and 20-lb., $48; 14 and 12-lb., $49, and 8 and 10-lb., $50 in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c. and of open-hearth, 1.56½c., Pittsburgh.

Sheets.—There is practically no new demand, the consuming trade being covered for the remainder of the year on blue annealed, electrical and also largely on ordinary black and galvanized sheets. Most mills have no blue annealed or electrical sheets to sell for delivery this year, but can spare some black and galvanized for delivery in two to three months. Prices on spelter are weak, and this is reflected in galvanized sheets, which are lower than for some months. The Pennsylvania Railroad has recently placed 3000 tons or more of blue annealed sheets for delivery late this year, the business being divided among three or four mills. Specifications are in hand for practically the entire output of sheets for the next two or three months, or longer, and shipments are heavy. We quote blue annealed sheets, Nos. 9 and 10, at 3c. to 3.25c., for delivery at convenience of the mill, which would be late this year. We quote No. 28 Bessemer and open-hearth black sheets at 2.90c. to 3c.; No. 28 galvanized, Bessemer and open-hearth, 4.60c. to 4.75c.; Nos. 22 and 24 black plate, tin mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plates.—New domestic inquiry is fair, but export demand is quite heavy. Most makers have their entire output sold up for the remainder of this year and are not quoting on foreign inquiries. Some domestic inquiry is in the market for the last quarter of this year and the first quarter of 1917, but so far the mills are refusing to sell for delivery beyond this year. We quote wasters from stock at $5.75 and primes at $6 for the domestic trade, while for export $6.25 to $6.50 per base box at mill is quoted. Several sales of fair-sized lots for export have been made at $6.25 per base box at mill. Prices on terne plate are firm, and we quote 8-lb. coated ternes at $8.50 to $8.75 for 200 lb. and $8.75 to $9 for 214 lb., all f.o.b. at maker's mill.

Skelp.—New inquiry is only fair, as consumers are covered for some time ahead and mills have their output of skelp sold up over the next three or four months. We quote grooved steel skelp at 2.35c. to 2.40c.; sheared steel skelp, 2.45c. to 2.50c.; grooved iron skelp, 2.70c. to 2.80c., and sheared iron skelp, 3c. to 3.10c., all delivered to consumers' mills in the Pittsburgh district.

Cold-Rolled Strip Steel.—Consumers are well covered over the remainder of the year and there is not much new buying. One contract for 800 tons for special delivery and a special grade was placed last week at 6.50c. per pound, base, f.o.b. Pittsburgh. We also note a sale of 150 tons for delivery in Canada at 6.05c. per pound, base, at mill. On contracts we quote cold-rolled strip steel at $6 per 100 lb., base, and on small lots for fairly prompt delivery, from $6.50 to $7. Extras, standard with all the mills, were printed in full on page 810 of THE IRON AGE of March 30.

Railroad Spikes.—The New York, New Haven & Hartford Railroad has placed 12,000 kegs with a local maker for delivery in the last half of this year. New inquiry is quiet, as most roads are covered for the remainder of the year. Regular prices, which are reported fairly strong, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, $2.65 to $2.75; railroad spikes, ½ and 7/16 in., $2.75 base; railroad spikes, ⅜ in. and 5/16 in., $3.05 base; boat spikes, $2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Nuts and Bolts.—Domestic inquiry is light, as consumers are covered over the remainder of the year and makers state they are specifying freely against orders. Export inquiry is also dull. Prices are reported firm.

Wire Rods.—New demand is quiet, as consumers are covered over the remainder of the year and are specifying freely against contracts. Prices on soft Bessemer and open-hearth rods range all the way from $50 to $60, depending on quantity and deliveries wanted. We quote soft Bessemer, open-hearth and chain rods from $50 to $60 per ton, Pittsburgh.

Wire Products.—In the event of war with Mexico, local makers of barb wire believe the Government would soon be in the market for large quantities for defensive and other purposes. The foreign inquiry is heavy, and it is said the entire inquiry from Russia recently for nearly 200,000 tons is being placed with domestic mills. The domestic demand for wire nails and wire is quiet, as consumers are covered through third quarter. One mill is still quoting $2.60 on nails for delivery in last quarter of this year. Some in the trade expect an advance in prices of nails and wire to be effective from July 1, but nothing official to confirm this has been given out. Regular prices are given on another page.

Iron and Steel Bars.—While it is true that one leading maker east of Pittsburgh is offering soft Bessemer steel bars for delivery in four to six weeks at 2.50c., Pittsburgh, there has been no change in prices on steel bars quoted by local mills, which is 2.50c. for such deliveries as they can make, and which would likely be in the last quarter. The local mills are quoting the same price to-day that they have been asking for some months. It is said that some implement business has been closed recently at 2.50c. at mill for delivery in the first half of 1917. Two fairly large inquiries for steel rounds are in this market and may be taken by a local mill if deliveries can be arranged. The demand for iron bars is only fair, as the trade is covered for some time ahead. We quote steel bars at 2.50c. by local mills for delivery probably not before last quarter, and also 2.50c. from one mill which is promising deliveries in four to six weeks. Small lots from warehouse are quoted at 3c. and higher, depending on quantity. We quote refined iron bars at 2.50c. to 2.60c., and railroad test bars at 2.70c. to 2.80c. at mill.

Rivets.—The new demand is only fair, consumers being covered for three or four months or longer. In some cases jobbers are quoting lower prices on rivets for fairly prompt delivery than the mills. Export inquiry is fairly heavy, one maker shipping two carloads recently to India. Makers' prices, which are sometimes shaded by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, at $4 per 100 lb., base, and conehead boiler rivets, same sizes, $4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Shafting.—There is not much new buying, consumers being covered over the remainder of the year, and mills have specifications in hand that will take their output the next three or four months. Some makers can spare a limited amount of shafting for last quarter delivery. We quote cold-rolled shafting at 20 to 15 per cent off in

carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Cotton Ties.—The price of cotton ties for this season's trade has been fixed at $1.35 per bundle of 45-lb., f.o.b. Pittsburgh, for July delivery, with ¾-cent per pound advance per bundle each month for deferred delivery. One authority in the trade estimates the requirements this year as 14,000,000 bundles. The makers of cotton ties are the Carnegie Steel Company and Pittsburgh Steel Company of Pittsburgh; Sharon Steel Hoop Company, Sharon, Pa.; George Conners, Helena, Ala., and the Alton Steel Company, Alton, Ill. Makers have been accumulating stocks for some time to cover the demand.

Hoops and Bands.—The new demand is quiet, as the trade is covered for this year. We quote steel hoops at 2.75c. and steel bands at 2.50c., with extras on the latter as per the steel bar card.

Merchant Steel.—New demand is quiet, but consumers are specifying freely against contracts. Prices are firm and on small lots are about as follows: Iron-finished tire, ½ x 1½ in. and larger 2.35c., base; under ½ x 1½ in., 2.50c.; planished tire, 2.55c.; channel tire, ¾ to ⅞ and 1 in., 2.85c. to 2.95c.; 1⅛ in. and larger, 3.25c.; toe chalk, 2.95c. to 3.05c., base; flat sleigh shoe, 2.70c.; concave and convex, 2.75c.; cutter shoe, tapered or bent, 3.25c. to 3.35c.; spring steel, 2.95c. to 3.05c.; machinery steel, smooth finish, 2.75c.

Wrought Pipe.—The new demand for merchant pipe has quieted down a good deal, but for casing and oil country goods is very active, a large amount of development work in the different oil fields going on at the present time. There is also some inquiry for small gas and oil lines, but these are not being closed very fast, oil and gas producers refusing to pay the high prices ruling on line pipe which are more than double what they were at this time last year. On nearly all lap-weld sizes the pipe mills are filled up for four or five months, but can make fairly prompt delivery on butt-weld. Discounts on iron and steel pipe, as given on another page, are firmly held.

Boiler Tubes.—While most consumers are covered over the remainder of the year, there is an active new demand for tubes for a large number of locomotives recently placed with three or four domestic builders by Russia. On locomotive and merchant tubes most makers have their output sold for practically the remainder of this year. Discounts on iron and steel tubes are firmly held and are given on another page.

Coke.—Active inquiries are in the market for 35,000 to 40,000 tons of blast-furnace coke per month for shipment from month to month and also for delivery over the last half of the year. We note a sale of 5000 tons of high-grade Connellsville furnace coke for July shipment at $2.50 per net ton at oven. The Producers' Coke Company, Uniontown, Pa., reports sales of about 8000 tons of best grades of furnace coke for prompt shipment at $2.60 to $2.65 at oven. Some blast furnaces in the East and in the Mahoning and Shenango valleys that formerly used Connellsville coke will use by-product coke starting July 1. These include two stacks of the Reading Iron Company, Reading, Pa., and one stack of the Alan Wood Iron & Steel Company, Conshohocken, Pa., which will then take coke furnished by the Lehigh Coke Company, South Bethlehem, Pa. Soon after July 1 the Youngstown Sheet & Tube Company will be making coke in its own Koppers by-product ovens, and this will displace 2000 tons or more daily of Connellsville coke, formerly partly made and partly bought by the company. We quote best grades of blast-furnace coke for prompt shipment at $2.40 to $2.50, and on contracts the average price seems to be about $2.50 per net ton at oven, having sold as low as $2.35 and as high as $2.65.

Old Material.—There is no betterment either in demand or prices of iron and steel scrap, the local market being at a standstill. Consumers apparently are covered ahead for some time, and it is said stocks now held by the steel mills in this district are heavier than at any time for several years. Embargoes have been declared on scrap routed to two leading consumers, which is intensifying the congested condition of the market. Hardly enough scrap is being sold on which to base prices. In almost an entire absence of sales, nominal prices quoted by dealers for delivery in the Pittsburgh and nearby districts that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	$15.50 to $16.00
No. 1 foundry cast	15.75 to 16.00
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
Hydraulic compressed sheet scrap	14.50 to 14.75
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	12.50 to 12.75
Bundled sheet stamping scrap	11.50 to 11.75
No. 1 railroad malleable stock	14.00 to 14.25
Railroad grate bars	11.00 to 11.25
Low phosphorus melting stock	19.00 to 19.50
Iron car axles	25.50 to 26.00
Steel car axles	26.00 to 26.50
Locomotive axles, steel	28.00 to 28.50
No. 1 busheling scrap	13.25 to 13.50
Machine-shop turnings	8.75 to 9.00
Old carwheels	14.00 to 14.50
Cast-iron borings	8.50 to 8.75
*Sheet bar crop ends	16.00 to 16.50
No. 1 railroad wrought scrap	18.75 to 19.00
Heavy steel axle turnings	12.00 to 12.25
Heavy breakable cast scrap	13.50 to 13.75

*Shipping point.

Chicago

CHICAGO, ILL., June 27, 1916.—(*By Wire.*)

The marketing of off-products incidental to steel manufacture on a tremendous scale under rigid specifications has never been more fully developed than at the present time. There are rejections of munitions steel bringing into the domestic market material to be disposed of at concessions. The heavy arbitrary discard from ingots of munitions steel is making available a large amount of excellent steel that is appearing in the form of billets, bars and plates for prompt delivery. Bessemer steel itself, reduced to the rank of an alternative by the overwhelming insistence upon open-hearth, is finding an outlet in export sales of rails and in the domestic market as plates, shapes, bars and sheets that command for early shipment prices corresponding to those quoted for forward delivery of open-hearth steel. Through the purchase of these materials many buyers are finding a convenient satisfaction of their requirements. When to this activity there are added the offerings of the so-called premium mills, which, choosing not to accumulate a backlog of orders, are now beginning to feel the effect of curtailment in new business and are accepting regular prices, most of the factors which have suggested a promise of easier conditions are disclosed. The past week has perceptibly weakened the hope of an early return of more normal conditions. New orders have been closed in excess of shipments; offerings of some 200,000 tons of steel for shipbuilding are being thrust upon the mills, and the pressure of inquiry for steel for export now pending concerns a larger aggregate than the mills can see their way clear to consider.

Pig Iron.—Consumer buying of foundry and malleable iron continues exceedingly limited. The absence of new demands is also accentuated by the inability of a number of prominent foundries to terminate their labor difficulties and resume the melting of iron on a normal scale. There has been some activity in resale iron, and evidence is discernible of an effort on the part of furnace interests to clean up the iron in speculative hands in the hope of removing from the market its detrimental influence. One lot of 5000 tons of resale iron changed hands here last week, a considerable portion of it being again resold to a consumer. Despite the inactivity, Northern iron prices are being maintained but Southern iron may be had on the basis of $14.50, Birmingham, without difficulty, and it is certain that other than direct furnace iron may now be had for less. It is understood that a considerable part of the American Steel Foundries basic requirements is still unsatisfied. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of $1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry,

malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5	$19.75
Lake Superior charcoal, No. 1	20.25
Lake Superior charcoal, No. 6 and Scotch	20.75
Northern coke foundry, No. 1	19.50
Northern coke foundry, No. 2	19.00
Northern coke foundry, No. 3	18.50
Southern coke, No. 1 f'dry and 1 soft	$19.00 to 19.50
Southern coke, No. 2 f'dry and 2 soft	18.50 to 19.00
Malleable Bessemer	19.50
Basic	19.00 to 19.50
Low phosphorus	34.00 to 36.00
Silvery, 8 per cent	31.50
Bessemer ferrosilicon, 10 per cent	33.50 to 35.50

(By Mail)

Rails and Track Supplies.—Inquiry for rails for South Africa, South America and elsewhere abroad, upon which quotations have recently been made, total approximately 25,000 tons. One inquiry for 12,000 tons is for France. Recent sales include 20,000 tons for Great Britain. All of these are Bessemer rails, and deliveries are at mill convenience with only partial shipment likely to be made before the close of the year. The necessities of foreign railroads are such as to result in the waiving of their own specifications and the acceptance of regular American specifications. Quotations to South Africa are on the basis of $40, f.o.b. mill. New domestic business is of no consequence. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, $50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, $33, base; open-hearth, $35; light rails, 25 to 45 lb., $40; 16 to 20 lb., $41; 12 lb., $42; 8 lb., $43; angle bars, 2c., Chicago.

Structural Material.—Except for the 3500 tons of steel shapes for the new plate mill of the Illinois Steel Company, to be furnished by the American Bridge Company, contracts placed last week were important only in their number. The Decatur Bridge Company will furnish 480 tons for the Lehman Building, Peoria, Ill.; the Pacific Rolling Mill Company, 300 tons for the Moore & Scott Iron Works, Oakland, Cal., and the Webster Iron Works, 227 tons for a school building at San Francisco. Seven additional contracts totaling about 1000 tons were distributed among as many fabricators. The jobbing of structural shapes by fabricators continues a disturbing element in the market, particularly in view of the fact that this situation is made the foundation of reports of easier price and delivery conditions in other lines as well. The trade is also disturbed by the offering of steel at 2.50c., Pittsburgh, for prompt shipment while deliveries on contracts at prices ranging from 1.40c. to 2c. have yet many weeks to run. To this incongruity importance and significance have been given out of proportion to the tonnage thus available for early delivery as compared with the contract business on the books of the mills. We quote for Chicago delivery of structural steel from mill 2.689c.

We quote for Chicago delivery of structural steel from jobbers' stock 3.10c.

Plates.—In this market alone, inquiry for steel for shipbuilding purposes, largely plates, will closely approximate 200,000 tons. Prices are being asked on the basis of delivery at mill convenience, with the expectation of shipment being largely made in the first quarter of 1917. On the basis of the open contract quotation of 2.90c., Pittsburgh, for such delivery, prospective buyers are endeavoring to place the business at 3c., Chicago, a large part of the demand being for Pacific coast and Orient delivery. Some of the independent mills are disposed to ask a higher price. For prompt delivery 3.50c., Pittsburgh, can be done for plates in narrow widths, while for a wider range of sizes, 3.60c. to 3.75c. is being asked and 4c. is still being done on occasion. Offerings of Bessemer plates for prompt delivery from a mill in the Pittsburgh district have recently appeared. We quote for Chicago delivery of plates from mill on contract 3.089c., and for prompt shipment 3.689c. to 4.189c.

We quote for Chicago delivery of plates out of jobbers' stock 3.50c.

Sheets.—Of the various classes of sheets only those which, in size and quality, are made by a comparatively small number of mills are being marketed on a firm basis of price. In the narrower widths, both black and blue annealed sheets show weakness in prices, the former selling at 2.75c. to 2.80c. and the latter at 2.90c. to 3c., Pittsburgh, as compared with 3.25c. for wide sheets. In all grades, including galvanized sheets, the volume of new inquiry is comparatively small. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.089c. to 3.339c.; box annealed, No. 17 and lighter, 2.939c. to 3.039c.; No. 28 galvanized, 4.939c. to 5.039c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.40c.; No. 28 black, 3.10c. to 3.20c.; No. 28 galvanized, 5.40c. to 5.50c.

Bars.—Of the increased amount of new business placed last week, bar-mill products were an important component. Sales for various purposes, including domestic and foreign orders, exceeded 25,000 tons. Steel for reinforcing purposes and for agricultural implement use absorbed a considerable portion of the tonnage, one implement sale calling for 5000 tons. A feature of these contracts is the fact that they were specified in full at the time of placing. These sales, and particularly the absorption of winter rolling capacity in bars by recent export sales, do not improve the situation of bar users who have thus far refrained from covering for the first half of 1917. Offerings of bar steel for munitions are reported as larger than the mills can possibly accommodate. Iron bars continue at 2.35c. and rail carbon steel at 2.50c. for third quarter delivery. Sales of discard steel from munition ingots continue an important factor, this material appearing not only in billet form but as bars, sheets and plates. A recent transaction involved 10,000 tons, the sale being made at a price closely approaching the basis for standard carbon billets. We quote, mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.689c.; nominal on contracts, 3.18c. for prompt shipment; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c.; base with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 10 per cent above list.

Rivets and Bolts.—Despite the congestion generally prevalent in the bolt trade, a few manufacturers continue to quote at concessions from the nominal schedule of prices. New inquiry, however, is sporadic, and is usually placed in accordance with the seller's rather than the buyer's convenience. The store price for rivets operates against the effective maintenance of manufacturer's scale of prices, and ordinary business can be placed as low as 3.75c., Chicago, although makers' quotations are 4c. to 4.15c., base, Pittsburgh. We quote carriage bolts up to ⅜ x 6 in., rolled thread, 50-10-5; cut thread, 50-5; larger sizes, 40-5; machine bolts up to ⅜ x 4 in., rolled thread, with hot pressed square nuts, 50-10-10; cut thread, 50-10; larger sizes, 40-10-5; gimlet point coach screws, 60; hot pressed nuts, square, $2.90 off per 100 lb.; hexagon, $2.90 off. Structural rivets, ¾ to 1¼ in., 3.50c. to 4c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 3.50c.; boiler rivets, 3.60c.; machine bolts up to ⅜ x 4 in., 60-10; larger sizes, 50-10; carriage bolts up to ⅜ x 6 in., 60-5; larger sizes, 50 off; hot pressed nuts, square, $3.25, and hexagon, $3.25 off per 100 lb.; lag screws, 65.

Cast-Iron Pipe.—The inquiry for 450 tons at Waukegan, Ill., is again up for quotations, and at Milwaukee 1000 tons of 48-in. is to be bought. Miscellaneous orders are in good volume, but individual tonnages are small. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $33.50 to $34; 6 in. and larger, $30.50 to $31, with $1 extra for class A water pipe and gas pipe.

Wire Products.—In the merchant trade the demand for wire products is much lighter, following the normal tendency at this season. Manufacturers, however, are still so far behind orders that the building up of warehouse stocks, customary at this time, is being practically neglected. Although there is still some disposition to buy on the part of the consumer, high prices and the large stocks on jobbers' hands have removed all inclination to speculative buying. Prices are unchanged. We quote as follows: Plain wire, Nos. 6 to 9, base,

$2.639; wire nails, $2.689; painted barb wire, $2.839; galvanized barb wire, $3.539; polished staples, $2.839; galvanized staples, $3.539, all Chicago.

Old Material.—The quotation of prices on the basis of consumers' purchases is increasingly difficult because of the very limited buying, and such prices are also a criterion in lessening degree of values for the dealer transactions, which constitute, almost completely, the market activity. Trading in heavy melting steel scrap is on a basis as low as $14.25 and in carwheels as low as $11.95. An offer of steel scrap on the basis of $14.25 was declined by a large consumer. Under such conditions the amount pressing for sale naturally exceeds the demand, but the larger volume of scrap throughout the territory, which can be held, is now being accumulated. In contrast the railroads, many of whom are effecting economies in the handling of scrap, appear to be anticipating their accumulations in their listings of old material for sale, the result being that the railroads have shipping instructions awaiting the gathering of scrap of various grades, which fact frequently avoids rehandling. Current lists are in the hands of the trade from the Illinois Central, Chicago, Milwaukee & St. Paul, and Burlington railroads. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton

Old iron rails	$18.00 to $18.50
Relaying rails	19.50 to 20.50
Old carwheels	12.00 to 12.25
Old steel rails, rerolling	15.00 to 15.50
Old steel rails, less than 3 ft	15.00 to 15.25
Heavy melting steel scrap	14.25 to 14.50
Frogs, switches and guards, cut apart	14.25 to 14.50
Shoveling steel	13.00 to 13.50
Steel axle turnings	9.25 to 9.75

Per Net Ton

Iron angles and splice bars	$18.25 to $18.75
Iron arch bars and transoms	19.50 to 20.00
Steel angle bars	13.50 to 14.00
Iron car axles	22.50 to 23.00
Steel car axles	22.75 to 23.25
No. 1 railroad wrought	14.75 to 15.25
No. 2 railroad wrought	13.75 to 14.00
Cut forge	13.75 to 14.00
Pipes and flues	10.75 to 11.00
No. 1 busheling	12.00 to 12.50
No. 2 busheling	8.00 to 8.50
Steel knuckles and couplers	14.00 to 14.50
Steel springs	14.50 to 15.00
No. 1 boilers, cut to sheets and rings	9.25 to 9.75
Boiler punchings	13.50 to 14.00
Locomotive tires, smooth	20.00 to 20.50
Machine shop turnings	5.50 to 6.00
Cast borings	5.50 to 6.00
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.25 to 9.75
Grate bars	10.00 to 10.25
Brake shoes	9.75 to 10.25
Railroad malleable	11.50 to 11.75
Agricultural malleable	10.75 to 11.25

Philadelphia

PHILADELPHIA, PA., June 27, 1916.

Despite the slowing up of new business recently noted in certain lines, with some declines in prices, sentiment is more confident that the market generally is in a strong position. This feeling is inspired in part by the heavy export buying of Bessemer and low phosphorus pig iron, the removal of which from this country is certain to eliminate the likelihood of a surplus in these grades. The approach of a new quarter is regarded as strengthening the situation in structural materials, inasmuch as many consumers who have been using comparatively low-priced steel will be forced into the market and compelled to face existing prices. What weakness there is in pig iron pertains to spot and nearby deliveries. Steel, in the form of billets, is as difficult as ever to obtain, if wanted promptly. The railroads are beginning to inquire for track materials they will need in 1917, including angle bars, tie-plates, bolts, etc., all of which, in the aggregate, compose an attractive tonnage. Forward deliveries of sheets are easier. The old material market shows no improvement; on the contrary, many items are lower. Eastern furnaces are inquiring for their last-half requirements of coke, and one good-sized contract has been closed. In point of activity plates continue to lead the entire market.

Pig Iron.—The recent heavy buying on foreign account, much more of which is indicated by existing inquiry, has inspired an optimistic tone. While it is not predicted that these sales will cause a shortage, it is regarded as certain that they will make a surplus highly improbable. The export demand continues confined to Bessemer and low phosphorus grades, and comes chiefly from Italy, denoting that, so far as it can, that country is making its own steel. The eastern Pennsylvania steel company which recently took an order to supply 30,000 tons of Bessemer for export is shipping to Baltimore, at the rate of 500 tons a day, the entire production of one furnace. Some business of this character, including a lot of 10,000 tons, has been declined by certain makers whose capacities are already taxed to a point where they cannot take on large orders. Eastern Pennsylvania Bessemer ranges from $22.75 to $23, seaboard, an offer of $22.50 having been declined. No activity in basic is reported, but a small steel plant near Chester has yet to buy. Standard low phosphorus commands $33 to $34, Philadelphia, and Lebanon low phosphorus, $29 to $30, furnace. Foundry iron has been inactive, except for small and scattered lots, for most of which it is asserted that full prices based on $20, furnace, have been paid, but this level has been cut, both in offerings and actual sales. Such weakness as there has been of late, however, pertains more to small lots of spot iron, rather than to forward deliveries. The Baldwin Locomotive Works has taken 500 tons of gray forge, on which one price submitted was $18.40, delivered. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa., No. 2 X foundry	$19.75 to $20.25
Eastern Pa., No. 2 plain	19.50 to 20.00
Virginia, No. 2 X foundry	21.25
Virginia, No. 2 plain	20.75
Gray forge	18.50 to 19.00
Basic	19.50 to 20.00
Standard low phosphorus	33.00 to 34.00

Iron Ore.—Arrivals of foreign ore at this port in the week ended June 24 consisted of 7740 tons from Cuba, 4495 tons from Spain and 3059 tons from Sweden. Emphasis continues to be laid on the possibility of a shortage in domestic ore later this year.

Ferroalloys.—Domestic 80 per cent ferromanganese is unchanged at $225 to $250, seaboard, for prompt delivery, the higher figure being asked for material not affected by Great Britain's restrictions. For the fourth quarter, $175 can be done, although this price has been that generally asked for the first quarter of 1917. For spot spiegeleisen $58 to $60 is quoted by one seller. There arrived at this port last week a shipment of 300 tons of English ferromanganese. A good export demand exists for ferromanganese, but conditions almost preclude any business in this direction. Contract ferrosilicon, 50 per cent, is unchanged at $83 to $85, Pittsburgh, according to quantity, and 11 per cent at $35.44.

Plates.—No let-up in demand is reported, and unfilled tonnages show no impairment. The railroad demand is heavy, both direct and through locomotive builders. The trade is anticipating the requirement which will be created by the definite closing of the order for 1000 locomotives for Russia. Meanwhile, the shipyards, both domestic and foreign, are looking for material, especially those in Japan. Quotations, which are without change, range from 3.909c. to 4.159c., Philadelphia. The Canadian inquiry calling for 5000 tons of car plates has not been placed, and is not being hurried in view of the material being wanted for 1917 delivery.

Bars.—The minimum quoted for open-hearth steel bars is 3.659c., Philadelphia, but Bessemer bars range considerably under this level, sales having been made in some instances at 2.659c., Philadelphia. Concrete reinforcing bars rolled from discarded shell steel are a decided factor in the market, and are to be had at about the price of regular Bessemer bars. Iron bars are without change at 2.659c., Philadelphia.

Structural Material.—The Pennsylvania Railroad and some of the Southern roads have issued miscellaneous bridge inquiries, the total tonnages of which have not been estimated. New business continues quiet, but quotations are unchanged. The approach of a new quarter is regarded with interest, inasmuch as consumers who have had contracts at prices under to-day's market will have to negotiate for material. Some of

them still have shapes which were purchased at not far from 1.50c., Pittsburgh, although most of this has disappeared. One Eastern maker continues to ask 3.159c., Philadelphia, for open-hearth shapes and the minimum of another is 3.659c., but some Bessemer shapes have been available at 2.909c., Philadelphia.

Billets.—Early deliveries appear to be as difficult as ever to procure. One buyer has made diligent search for 4-in. square billets for early delivery without success. From October on deliveries are obtainable. Eastern Pennsylvania makers who continue to quote ask $50 for open-hearth rerolling steel and $65 for forging steel. The export demand continues heavy. The wants of regular consumers are pretty well covered for the third quarter.

Sheets.—For nearby delivery 3.909c. to 4.159c., Philadelphia, continues to be quoted on No. 10 blue annealed, but on competitive business in futures considerably less can be done, possibly as low as 3.159c.

Coke.—An eastern Pennsylvania furnace has closed for its last half requirement of 17,000 to 20,000 tons of furnace coke, and other furnaces are feeling round for their supply. The quotations for prompt furnace range from $2.40 to $2.50 per net ton at oven, although some coke of an inferior grade is offered at considerably less. Contract furnace ranges from $2.50 to $2.65. Prompt foundry ranges from $3.25 to $3.50 per net ton at oven, and contract is quoted at about $3.50. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The freight difficulties, oversupply, and anxiety on the part of dealers to sell combine to weaken the market at a time when buying is confined to small lots. A few weeks of quiet are looked for by the trade. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania, and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$14.75 to $15.25
Old steel rails, rerolling	17.00 to 18.00
Low phos. heavy melting steel scrap	20.50 to 21.50
Old steel axles	26.00 to 27.00
Old iron axles	28.00 to 29.00
Old iron rails	20.00 to 20.50
Old carwheels	16.00 to 16.50
No. 1 railroad wrought	19.50 to 20.00
Wrought-iron pipe	12.50 to 13.00
No. 1 forge fire	13.00 to 13.50
Bundled sheets	13.00 to 13.50
No. 2 busheling	10.50 to 11.00
Machine shop turnings	8.50 to 9.00
Cast borings	10.00 to 10.50
No. 1 cast	16.00 to 16.50
Grate bars, railroad	11.75 to 12.25
Stove plate	11.75 to 12.25
Railroad malleable	13.50 to 14.00

Cleveland

CLEVELAND, OHIO, June 27, 1916.

Iron Ore.—Labor troubles in the Mesaba range, caused by I. W. W. agitators, while they have closed down a number of mines, so far have not affected shipments and boats are getting their cargoes without delay. About every available vessel is in the ore trade, and June is expected to set a new record for shipments. We quote prices as follows, delivered lower Lake ports: Old range Bessemer, $4.45; Mesaba Bessemer, $4.20; old range non-Bessemer, $3.70; Mesaba non-Bessemer, $3.55.

Pig Iron.—New foreign inquiries have come out for 50,000 tons or more of Bessemer and malleable iron, but no new additional export sales are reported by Cleveland interests. The American Steel Foundries, which was recently in the market for 10,000 tons of basic iron for Sharon and Alliance but which withdrew the inquiry a little later, has again come in the market for this tonnage. Foundry grades are very dull. Cleveland prices are about 50c. a ton lower for Cleveland delivery. For some time local furnaces held foundry iron at $19, at furnace, for local delivery, but they are now asking $18.50, the same price they are getting for outside shipment. The Southern price situation is unchanged, furnace quotations being $14.50, Birmingham, for No. 2 for last half and $14.50 to $15 for the first half of next year, while resale iron is available at $13.50. At the prevailing furnace quotations Southern iron is lower in this territory than Northern iron, but northern Ohio furnaces generally appear to be holding to the $18.50 price, declining to meet Southern competition. The melt in this territory is being affected somewhat by labor troubles and by the scarcity and poor quality of labor. Because of the labor situation foundries not affected by strikes are said to be producing only from 65 to 80 per cent of their maximum output. We quote, delivered Cleveland, as follows:

Bessemer	$21.95
Basic	18.95
Northern No. 2 foundry	$18.70 to 18.80
Southern No. 2 foundry	18.00 to 18.50
Gray forge	18.50
Jackson Co. silvery, 8 per cent. silicon	28.62 to 30.62
Standard low phos., Valley furnace	32.00

Coke.—A Cleveland consumer has contracted for Indianapolis by-product coke for its first half requirements at $4.75, or equivalent to $4.85, Connellsville. The market generally is quiet and prices on Connellsville coke are unchanged at $3 to $3.25 per net ton at oven for prompt shipment and $3.25 to $3.50 for contracts for the best makes. We note the sale of a small lot of furnace coke for prompt shipment at $2.50.

Bolts, Nuts and Rivets.—Specifications for bolts and nuts are coming out in heavy volume. Although plants are crowded to capacity they are not catching up on deliveries. No new business is being placed. Prices are very firm. The new demand for rivets is not active but specifications are good. Prices are unchanged at 4c., Pittsburgh, for structural rivets and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, ⅝ x 6 in., smaller or shorter, rolled thread, 50 and 10; cut thread, 50; larger or longer, 40; machine bolts with h. p. nuts, ⅝ x 4 in., smaller and shorter, rolled thread, 50, 10 and 5; cut thread, 50 and 5; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 10; square h. p. nuts, blank or tapped, $2.90 off the list; hexagon, h. p. nuts, blank or tapped, $2.90 off; c. p. c. and t. square nuts, blank or tapped, $2.60; hexagon nuts, all sizes, $3 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 10.

Finished Iron and Steel.—There is a good demand for steel bars for early shipment, this business coming largely from consumers that are unable to secure deliveries on contracts as promptly as desired. Bessemer steel bars are quoted at 2.50c. to 2.75c., Pittsburgh, and structural material at 2.75c. for prompt delivery. These prices are diverting business that has been going to the warehouses, which have not reduced their much higher prices. There is a good demand for small angles and in building lines considerable small work is coming out, although large building operations are being held up because of high prices. A Cleveland manufacturer has placed an order for 20,000 tons of light section rails which will be used in filling an order just closed with the French Government for last half delivery. A Cleveland mill is in the market for about 10,000 tons of sheet bars per month for third quarter delivery which are quoted at 46 by a local mill. Corrigan, McKinney & Co. have placed 5000 tons of structural material with the American Bridge Company for four open-hearth furnaces. New demand in the automobile field has been created by a large order for motor trucks placed by the War Department with a Cleveland builder. Some inquiry for steel bars from implement makers and other consumers has come out for the first half of next year, but the price quoted, 2.50c., Pittsburgh, not subject to cancellation or revision, does not appear attractive to buyers. However, one of the largest consumers in this territory is understood to have covered for its bar requirements for that delivery. Plates continue in good demand, with prices ranging from 3.50c. to 4c., Pittsburgh. The demand for hard steel bars has fallen off. Bar iron is in fair demand and is quoted at about 2.50c., Cleveland. There is a fair call for sheets, particularly for pickled and annealed sheets, but buying for the most part is for early requirements. The market is firm, except on galvanized sheets. We quote black sheets at 2.90c. to 3c., Ohio mill, for No. 28; blue annealed at 3c. to 3.25c. for No. 10, and galvanized at 4.65c. to 4.75c. for No. 28. Warehouse prices are unchanged at 3.25c. for

steel bars and structural material, 3.65c. for plates and 3.20c. for iron bars.

Old Material.—The market is weak and dull. Dealers still have large tonnages to ship during July on contracts placed some time ago, and a few additional sales are reported for July delivery. A further decline of about $1 a ton is reported in busheling, and a local mill has taken 500 tons of No. 1 busheling at $12. Borings and turnings are a drug on the market, and the latter are slightly lower. The embargo against the Upson Nut Company has been lifted, and this has caused some improvement in the local situation. At the present low prices some of the yard dealers are stocking up. We quote f.o.b. Cleveland as follows:

Per Gross Ton

Steel rails	$15.50 to $16.00
Iron rails	18.50 to 19.00
Steel car axles	28.00 to 29.00
Heavy melting steel	15.00 to 15.25
Carwheels	13.50 to 13.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	15.50
Steel axle turnings	12.00 to 12.25
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton

Iron car axles	$23.00 to $24.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings	6.00 to 6.25
No. 1 busheling	11.50 to 12.00
No. 1 railroad wrought (nominal)	15.00 to 15.50
No. 1 cast	14.00 to 14.25
Railroad grate bars	9.00 to 9.50
Stove plate	10.00 to 10.25

Cincinnati

CINCINNATI, OHIO, June 28, 1916.—(*By Wire.*)

Pig Iron.—Offerings of Southern resale iron that must be moved or stored before July 1 have brought out some low prices. A little business has been transacted at $13.50, Birmingham basis, and it is rumored that even this figure could be shaded. However, holders of warrants are said to have now set $14 as their minimum price and for prompt acceptance only. Some scattered inquiries have been received from Indiana melters, but it is the opinion of the trade that most consumers are simply asking for prices in order to keep in touch with market conditions. This theory is borne out by the small number of orders that have recently been placed. The largest purchase reported was made by a central Ohio firm covering 800 tons of mixed Southern grades for prompt shipment. Iron merchants who have Eastern agencies state that business is improving in that section of the country. Furnace prices are unchanged in the Hanging Rock district, and $19, Ironton, is the universal quotation for shipment either this year or in the first half of next year. A comparatively small tonnage of resale iron in that territory can be obtained at $18.50. Exclusive of the silvery irons, a competent authority estimates that the total furnace stocks in southern Ohio will barely run above 10,000 tons. Very little high silicon iron has been sold lately, and $27 at furnace is considered the minimum price made by the Northern producers, but competition from Southern furnaces is a factor that somewhat disturbs the market, especially where freight rates can be taken advantage of. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft	$17.40 to $18.40
Southern coke, No. 2 f'dry and 2 soft	16.90 to 17.90
Southern coke, No. 3 foundry	16.40 to 17.40
Southern coke, No. 4 foundry	15.90 to 16.90
Southern gray forge	15.40 to 16.40
Ohio silvery, 8 per cent silicon	28.26 to 28.76
Southern Ohio coke, No. 1	20.76 to 21.26
Southern Ohio coke, No. 2	19.76 to 20.26
Southern Ohio coke, No. 3	19.26 to 19.76
Southern Ohio malleable Bessemer	19.76 to 20.26
Basic, Northern	19.76 to 20.26
Lake Superior charcoal	21.20 to 22.20
Standard Southern carwheel	24.90 to 25.40

(By Mail)

Finished Material.—It is stated that light steel rails can now be bought below regular market quotations. While the Pittsburgh price on steel bars is unchanged at 2.50c., competition from a few independent mills has enabled customers to buy at a lower figure. The local warehouse business shows a slight improvement over last week's report, with twisted steel bars in better demand than any other class of material. We quote from stocks as follows: No. 10 blue annealed sheets, 3.50c.; steel bars and small structural shapes, 3.20c.; wire nails, $2.75 per keg, base; barb wire, $3.60 per 100 lb.; plates, 3.50c.; smaller sizes machine bolts, 60 per cent off list; larger sizes, 40 and 10 and 5 per cent off; hot pressed square and hexagon nuts, 2.70c. off list; malleable washers 5½c. per pound; cast-iron washers, 3c. per pound, and cold-rolled rounds, 10 per cent plus list. The nearby mills quote No. 28 black sheets at 2.90c., f.o.b. Cincinnati or Newport, Ky., and No. 28 galvanized sheets at 4.90c.

Coke.—Selling agencies report that both furnace and foundry coke is dragging, with no demand from any source. No complaints from any source are made as to holding up shipments on old contracts; on the other hand, the foundries are taking a little more coke than is due them. We quote prompt Connellsville 48-hr. brands around $2.35 to $2.40 per net ton at oven, with contract prices ranging from $2.50 to $2.60; Connellsville foundry coke, $3 to $3.50. Pocahontas and Wise County operators are asking from $3.25 to $3.50 and New River foundry coke is unchanged at $4.

Old Material.—The market is weaker, and so many different quotations have been obtained that it is difficult to reach the average price on any kind of scrap. Consumers who have not contracted far ahead are only buying for immediate requirements. Yard stocks are heavy, and dealers are not disposed to add to them. The following are dealers' prices to consumers, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton

Bundled sheet scrap	$11.25 to $11.75
Old iron rails	15.50 to 16.00
Relaying rails, 50 lb. and up	21.00 to 21.50
Rerolling steel rails	14.50 to 15.00
Heavy melting steel scrap	14.00 to 14.50
Steel rails for melting	13.00 to 13.50

Per Net Ton

No. 1 railroad wrought	$13.25 to $13.75
Cast borings	4.75 to 5.25
Steel turnings	5.25 to 5.75
Railroad cast scrap	11.00 to 11.50
No. 1 machinery cast scrap	12.75 to 13.25
Burnt scrap	8.25 to 8.75
Iron axles	21.00 to 22.00
Locomotive tires (smooth inside)	19.50 to 20.00
Pipes and flues	9.50 to 10.00
Malleable and steel scrap	10.75 to 11.25
Railroad tank and sheet scrap	8.50 to 9.00

St. Louis

ST. LOUIS, MO., June 26, 1916.

Pig Iron.—The demand continues in small lots for special purposes or to cover immediate needs, with purchases made from furnaces rather than from brokers possessed of resale lots, because the latter do not meet the requirements. Warrant iron has found practically no takers in this market, though it has had the effect of unsettling conditions. The foundries still have ample supplies but are using them up rapidly, and it is predicted that a buying movement will be on in this market soon after the opening of the last half.

Coke.—No purchases are reported of more than very small lots. An inquiry is out for 30,000 tons of furnace coke for spelter use.

Finished Iron and Steel.—Finished products are moving steadily on contracts, with some increase of pressure for the filling of specifications. New business is about the same as for some weeks. Out of warehouse the movement continues heavy, practically up to capacity to handle the orders. For stock out of warehouse we quote as follows: Soft steel bars, 3.15c.; iron bars, 3.10c.; structural material, 3.15c.; tank plates, 3.55c.; No. 10 blue annealed sheets, 3.30c.; No. 28 black sheets, cold rolled, one pass 3.30c.; No. 28 galvanized sheets, 5.55c.

Old Material.—Quotations are nominal, for there is not enough business going on to make a real price. Even the dealers are out of the market to cover short sales, while consumers cannot be induced to consider real bargains, having ample supplies in their yards. There is a little tendency to ask for foundry grades, but not enough to be regarded as of moment. Rejections are very severe. The only list out is one of 2500 tons from the Burlington. Relayers are still strong and

scarce, with supplies difficult to find. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton

Old iron rails	$16.25 to $16.75
Old steel rails, rerolling	15.25 to 15.75
Old steel rails, less than 3 ft.	15.75 to 16.25
Relaying rails, standard section, subject to inspection	22.00 to 23.00
Old carwheels	11.25 to 11.75
No. 1 railroad heavy melting steel scrap	14.50 to 15.00
Heavy shoveling steel	12.50 to 12.75
Frogs, switches and guards cut apart	14.25 to 14.75
Bundled sheet scrap	9.25 to 9.75

Per Net Ton

Iron angle bars	$15.25 to $15.75
Steel angle bars	12.75 to 13.25
Iron car axles	22.75 to 23.25
Steel car axles	24.00 to 24.50
Wrought arch bars and transoms	19.00 to 19.50
No. 1 railroad wrought	14.50 to 14.75
No. 2 railroad wrought	14.25 to 14.50
Railroad springs	13.25 to 13.75
Steel couplers and knuckles	13.25 to 13.75
Locomotive tires, 42 in. and over, smooth inside	18.25 to 18.75
No. 1 dealers' forge	10.25 to 10.75
Mixed borings	5.50 to 6.00
No. 1 busheling	11.50 to 12.00
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
No. 1 railroad cast scrap	11.00 to 11.50
Stove plate and light cast scrap	8.25 to 8.75
Railroad malleable	10.50 to 11.00
Agricultural malleable	9.50 to 10.00
Pipes and flues	9.50 to 10.00
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	8.25 to 8.75
Machine shop turnings	6.75 to 7.00

Buffalo

BUFFALO, N. Y., June 27, 1916.

Pig Iron.—The market continues quiet as regards new business, with inquiry light. The aggregate of transactions in all grades with all selling interests did not exceed 3000 tons for the week. Furnace prices are firm as quoted below. It is found, however, that some resale iron has been disposed of at prices ranging from $18 to $19, at Buffalo furnaces, covering the various grades, the demand being principally for No. 2 X foundry and malleable. Shipments from furnaces are heavy. We quote as follows for last half delivery and extending into the first half of next year, f.o.b. furnace, Buffalo:

No. 1 foundry	$19.00 to $19.50
No. 2 X foundry	18.50 to 19.50
No. 2 plain	18.50 to 19.00
No. 3 foundry	18.50 to 18.75
Gray forge	18.50
Malleable	18.50 to 19.50
Basic	19.50 to 20.00
Bessemer	21.00 to 22.00
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Inquiry is stagnant as compared with a few weeks ago, the current demand being confined chiefly to small filling in lots for special requirements. Contract quotas are being pretty regularly taken out by all consumers regardless of the long time deliveries they are compelled to accede to, and the tonnage that users have put on mill books will be called for complete with few, if any, cancellations. The largest local producer of bars, plates and shapes is filled to entire capacity practically to the end of the year. The Seneca Iron & Steel Company, Buffalo, has this week received an order for a considerable tonnage of sheets for automobile work. Bids will soon be taken for 200 tons of reinforcing bars for plant extension for the Titanium Alloy Mfg. Company, and also for a large tonnage of reinforcing bars for an extensive addition to the plant of the Niagara Alkali Company, both at Niagara Falls. Bids are being called for this week for 200 tons of structural steel for a store and office building on Delaware Avenue, Buffalo, for Mitchell Parker & Brown.

Old Material.—The market is slack as to demand for most of the commodities on the list. All of the in-transit carload material resulting from embargoes has been disposed of and the market, cleared of this material, has settled down into a waiting condition until such time as consumers are again more freely in line for purchasing. The demand for turnings and borings is, however, of fair volume, the principal business transacted being in these two commodities, considerable tonnages having been sold. Prices remain unchanged from last week, with the exception of old carwheels, the price of which has fallen off 50c. per ton. We quote dealers' asking prices as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$15.50 to $16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	24.00 to 24.50
Iron axles	24.00 to 24.50
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 15.50
Machine shop turnings	7.00 to 7.50
Heavy axle turnings	12.00
Clean cast borings	8.00 to 8.25
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Birmingham

BIRMINGHAM, ALA., June 26, 1916.

Pig Iron.—Furnace interests have not marked their price below $15, but are free to confess that attractive offerings would secure concessions. The disposition of ship owners to reduce freight rates has served to stimulate the export business slightly, but concessions must be much deeper before that movement assumes large proportions. Lots of 1000 to 3000 tons for Genoa have been booked. One will go at an ocean rate of $28 per ton. Southern ports have offered $30 per ton and $1.50 per 100 lb. but these rates are not securing business. The export orders booked are understood to have been at around $1 under the domestic price. Makers would probably be glad to yield several points for foreign trade in order to move the iron and stabilize the domestic market. A sale of 500 tons of high silicon brought a level of $14.75. Carload lots go on the uniform basis of $15. A new interest just entering the market has sold 2500 to 3000 tons for the rest of the year at $15. Resale metal continues to be a thorn in the side, because, although it is unattractive to the consumer, its continued offering at low prices creates confusion. Makers will hereafter try to avoid creating such a condition. The leading interest announces well-filled order books and no particular interest in the foundry market, but quotes $15 for the rest of the year and $15.50 for 1917, but with nothing doing in the latter. There are no more stop orders than orders anticipating shipments. A critical period is approaching, however. When the first half of the year turns, producer and consumer will trade. If the maker cannot get $15, he will take less. The waiting attitude is beginning to wear on the nerves. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 soft and foundry	$15.25 to $15.50
No. 2 soft and foundry	14.75 to 15.00
No. 3 foundry	14.25 to 14.50
No. 4 foundry	14.00 to 14.25
Gray forge	13.75 to 14.00
Basic	14.75 to 15.00
Charcoal	22.00 to 22.50

Cast-Iron Pipe.—Pipe makers are free to admit that high prices have caused the postponement of some large propositions and are not altogether opposed to a readjustment of prices from raw material up. Fresh orders are fair in the aggregate, and justify a rather optimistic outlook, but some plants are going to take considerable holiday around July 4. Sanitary shops report a heavy falling off in orders and are preparing to go on shorter time. We quote per net ton, f.o.b. pipe shop yards, as follows: 4-in. $28; 6-in. and upward, $25, with $1 added for gas pipe and 16-ft. lengths.

Coal and Coke.—The coal market has settled down to slacker conditions since the renewal of large railroad contracts, and operators complain of reduced trade territory and the inroads of hydroelectricity. Coke is affected by a scarcity of labor. Best beehive foundry makes bring from $4 to $4.25 per net ton at oven, with some as high as $4.50. The ruling price seems to be $4.25. Coke moves as soon as made, the demand being exceedingly strong.

Old Material.—The scrap market is still softer.

Steel mills report ample stocks on hand. Scrap has been accumulating for a long time and much low-priced pig iron has been used in foundry mixtures. The market is featureless. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles	$24.00 to $25.00
Old steel rails	11.00 to 11.25
No. 1 steel scrap	9.50 to 10.00
No. 1 wrought scrap	13.00 to 13.50
No. 1 cast scrap	11.00 to 11.50
Extra heavy cast scrap	9.50 to 10.00
Stove plate and light	10.00 to 10.50
Old carwheels	10.50 to 11.00
Tram carwheels	9.50 to 10.00

New York

NEW YORK, June 28, 1916.

Pig Iron.—Domestic inquiry is light, and there are some instances of shipments being held up. On the other hand there is still much talk of the export business that has been up for a number of weeks. Details of the 30,000-ton sale of Bessemer iron reported in the East last week are wanting, but at the same time there is the report that 12,000 tons of Bessemer sold by a Central Western interest to Italy two weeks ago has been canceled. So many dealers' houses are taking a hand in this business that there is much duplication in the 100,000 tons supposed to be before the market, both Bessemer and foundry iron. Several sales of 1000 and 2000 tons of export iron were made in the past week. Resale iron is still figuring in sales for home consumption, and this has included both Buffalo and Virginia irons. On resale iron in Virginia as low as $17.50 at furnace has been done on No. 2X. Some furnaces there continue to quote $18.50 for No. 2X for second half. Spot iron has gone at considerably less, and a sale of 3000 tons of iron to a pipe company belongs in this latter category. We quote at tidewater for early delivery: No. 1 foundry, $20.50 to $21; No. 2X, $19.75 to $20.25; No. 2 plain, $19.50 to $20; Southern iron at tidewater, $20 to $20.50 for No. 1 and $19.50 to $20 for No. 2 foundry and No. 2 soft.

Plates.—On an inquiry from Japan for 10,000 tons of ship plates as high as 4½c. has been bid, and demand from this and other foreign sources is strong. Local domestic demand, especially outside of shipyards, is very quiet, but Eastern mills are congested and are likely to be for some time. Specifications on contracts have been up to the limit as the first half closes, only an occasional buyer declining to take the material allotted. Such cases have been due to inability to use the plates because of adverse labor conditions. While plates have sold at 2.75c. to 3c., Pittsburgh, with delivery at convenience of the mill, one contract for delivery early in 1917 has been placed with an Eastern mill at 4c. The car situation is exceedingly dull. Since last week the American Car & Foundry Company has taken 54 passenger cars for the Chicago & Northwestern and 100 ballast and 8 mail baggage cars for the Texas & Pacific. The Baltimore & Ohio will not now buy 1000 underframes, nor will the Rock Island purchase 300 center constructions, and the San Pedro, Los Angeles & Salt Lake postpones the buying of 300 automobile cars. We quote mill shipments at 2.919c. to 4.169c., New York, the lower price for attractive lots of Bessemer plates for early shipment and for future shipments of open-hearth steel and the higher prices for early shipment of open-hearth plates. Lots from warehouse go at 4c. to 4.25c., New York.

Iron and Steel Bars.—The general situation is satisfactory, with foreign inquiries numerous and domestic demand good and improving. Specifications as the first half closes are large. Bar-iron demand continues in good volume, and producers have all the orders they can handle. Mill shipments of iron bars are quoted at 2.669c., New York. For steel bars we quote 2.669c. to 3.169c., New York, according to the urgency of the delivery with 2.919c., New York, as the quotation for the largest lots for prompt shipment. From warehouse we quote iron and steel bars at 3.10c. to 3.30c., New York.

Ferroalloys.—About 150 tons of British ferromanganese for delivery in the last quarter at $200, seaboard, has been sold, and this constitutes the extent of the present demand. Consumers seem well covered and arrivals continue good. The quotation is $175, seaboard, for 1917 delivery, $200 for last quarter and $225 to $250 for spot material. Speigeleisen is quiet at $50 to $55, furnace, on contract and about $60 for spot material. Manganese ore from Brazil is commanding as high as 78c. per unit at seaboard, 70c. having been recently refused. Ferrosilicon, 50 per cent, is strong and active at $83 to $85, Pittsburgh, on contract and $90 to $100 per ton for prompt delivery.

Structural Material.—Inability to obtain material rather than high prices is regarded in some quarters as the reason for the quietness of the market and the backwardness in placing contracts. Inquiries are more numerous than they were a week or so ago and fabricators are still busy. Specifications on contracts are rather better as the first half closes. All bids have been rejected on the 33,000 tons of structural steel necessary for the completion of the subway and elevated construction of New York City, apparently in the hope of lower prices. Over 3000 tons of railroad inquiries for bridges have appeared, the Pennsylvania Railroad asking for bids on 2500 tons, the Southern Railway on 250 tons and the New York, New Haven & Hartford on 200 tons for five small bridges. Bids have been asked on 1200 tons, instead of 800 tons as formerly reported, for an office building at Springfield, Mass., known as the Besse Building; on 300 tons for a hotel at Harrisburg, Pa., and on 500 tons for a six-story building for Daniel Meenon on Fifty-fifth Street west of Ninth Avenue. Bids are also to go in this week on 600 tons for an apartment house at 250 West 103d Street. It is probable that decisions will be made this week on the 2000 tons involved in the six-story loft building at 403 East 104th Street and on 800 tons for the 14-story apartment for the Candler Holding Company at Edgecomb Avenue. Bids will soon be asked for on 800 tons for a 14-story apartment at 228 to 236 West Seventy-first Street. The J. J. Hearn apartment at 105 West Fifty-fifth Street, 500 tons, is still pending, and the 650 tons for the Herzog apartment at 64 West Eighty-sixth Street is held up. The principal new contracts which have been let include 1150 tons for an apartment, 550 Park Avenue, to the Phoenix Iron Company, and 550 tons for the Stotesbury residence at Chestnut Hill, Philadelphia, to the same fabricator. The American Bridge Company has taken 200 tons for six bridges for the Boston & Albany, 400 tons for some bridges for the Lehigh Valley, 200 tons for two bridges for the Norfolk & Western and 400 tons for the Portland terminal at Portland, Me. The Pennsylvania Steel Company has taken 300 tons for bridges for the Lehigh Valley and has been awarded a contract for a pier shed at Erie Basin, Brooklyn. The George A. Just Company will furnish 300 tons for the Greenwich Settlement House, Barrow Street, and the P. J. Carlin Construction Company is general contractor for the 350 tons for the Kings County Courthouse. We quote mill shipments at 2.669c. to 2.919c., New York, and from warehouse at 3.25c. to 3.30c., New York.

Cast-Iron Pipe.—About the only public letting in sight at present in this territory is that of the District of Columbia at Washington, D. C., July 10, for 297 net tons of 12-in. pipe and 56 tons of fittings. As the dullness in the pig-iron market and the tendency of pig-iron prices to soften have been credited in some quarters as having influenced the disposition of pipe buyers to withhold orders, it is interesting to note that the volume of private buying has recently been better than it was a month ago. The scarcity of common labor which interferes with the progress of laying pipe perhaps is a stronger retarding influence in the market than any other. Prices are firm. Carload lots of 6-in., class B and heavier are held at $30.50 per net ton, tidewater, class A and gas pipe taking an extra of $1 per ton.

Old Material.—The market is extremely quiet. Embargoes at important consuming points in eastern Pennsylvania, coupled with abundant quantities of old material coming out, are exerting a depressing influence in the trade. Inquiry from consumers is almost wholly lacking. Exceptions to the general dullness are

to be found in respect to relaying rails and old steel car axles, which are in continued good demand for export. Brokers are reducing their buying prices and quote about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications)	$11.75 to $12.25
Old steel rails (short lengths) or equivalent	12.75 to 13.25
Relaying rails	28.00 to 30.00
Rerolling rails	15.50 to 16.00
Iron car axles	26.00 to 27.00
Steel car axles (for domestic use)	28.50 to 29.00
Steel car axles (for export)	30.00 to 31.00
No. 1 railroad wrought	18.00 to 18.50
Wrought-iron track scrap	15.00 to 15.50
No. 1 yard wrought, long	14.50 to 15.00
No. 1 yard wrought, short	11.75 to 12.25
Light iron (nominal)	5.00
Cast borings (clean)	8.00 to 8.25
Machine shop turnings (nominal)	6.25 to 6.50
Mixed borings and turnings	6.50 to 6.75
Wrought pipe	10.00 to 10.50
Old carwheels (nominal)	15.00 to 15.50
Malleable cast (railroad)	12.25 to 12.75

Foundries are apparently as little interested in buying scrap as the steel works and rolling mills. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery)	$16.50 to $17.00
No. 2 cast (heavy)	15.00 to 15.50
Stove plate	12.00 to 12.50
Locomotive grate bars	12.00 to 12.50

British Steel Market

Pig-Iron Output to Be Increased—Demand for American Steel Less

(By Cable.)

LONDON, ENGLAND, June 28, 1916.

Increased pig-iron production is certain shortly and in the meantime domestic consumption fully absorbs the output. License difficulties are unremoved. American billets are dull and nominal. Tin plates are irregular at 35s. Quotations, mostly nominal, are as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 35s., against 36s. 6d. a week ago.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works port, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, about 140s.

Sheet bars (Welsh) delivered at works in Swansea Valley, £14 5s.

Steel bars, export, f.o.b. Clyde, £18 5s.

Ferromanganese, £35 nominal.

Ferrosilicon, 50 per cent, c.i.f., £29.

May exports of merchandise exceeded those of any preceding month in the history of the country. The total value was $472,000,000, which was $61,000,000 above March and $300,000,000 more than the monthly average for May from 1911 to 1914. The imports for May were also the greatest on record, the total value being $229,000,000, an increase of $11,000,000 over April, the previous high mark. The favorable balance of trade in the month and twelve months ending with May was the largest ever known. For May it was $243,000,000 and for the year ending with May, $2,026,000,000.

The Luster-Jordan Company, Inc., has acquired the plant and business of the Jordan Machine Company, Norristown, Pa., and will continue the manufacture of the Jordan lock-corner wood box machinery. Additional equipment has been installed which enables the company to build special machinery, jigs, tools, fixtures, etc. E. J. Luster, vice-president and general manager, is in active charge of the company.

The Standard Motor Car Company, Pittsburgh, with a capital stock of $5,000, has been incorporated by Roy R. McIntire, East Pearl Street, Butler, Pa.; Joseph Leacock, Pittsburgh, and John H. Alleman, Butler, to manufacture and repair automobiles.

Iron and Industrial Stocks

NEW YORK, June 28, 1916.

The general course of the stock market has been downward for several days. The Mexican situation, which at first was not regarded as a disturbing influence on securities, has apparently unnerved the speculative element and has proved to be an unsettling factor. Another development, not without considerable effect, was the court decision ordering a dissolution of the Corn Products Refining Company, which had not been anticipated. The general stock market was further unfavorably influenced by the quite severe liquidation in the stocks of copper producing companies. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	22⅝- 25⅛	Ry. Stl. Spring, com.	41½- 44½
Allis-Chal., pref.	78½- 82½	Ry. Stl. Spring, pref.	96⅝- 97½
Am. Can, com.	50¼- 55⅞	Republic, com.	42 - 46½
Am. Can, pref.	109¼-109¾	Republic, pref.	106⅞-107½
Am. Car & Fdy., com.	54⅝- 58½	Sloss, com.	46½- 50
Am. Car & Fdy., pref.	116¼-118	Pipe, com.	19½- 22¼
Am. Loco., com.	65¼- 71	U. S. Steel, com.	82⅝- 85
Am. Loco., pref.	102 -102½	U. S. Steel, pref.	116¾-117⅞
Am. Steel Fdries.	46¼- 50¼	Va. I. C. & Coke	50
Bald. Loco., com.	76 - 86¾	Westing. Elec.	56⅝- 60¼
Bald. Loco., pref.	104	Am. Rad., pref.	134⅞-135
Beth. Steel, com.	427½-444½	Am. Ship, com.	43 - 44⅜
Colo. Fuel	39½- 42	Am. Ship, pref.	90
Deere & Co., pref.	90¼- 91¼	Chic. Pneu. Tool.	68 - 71½
Gen. Electric	164¾-168⅛	Cambria Steel	85
Gt. No. Ore Cert.	33⅝- 37½	Lake Sup. Corp.	10½- 11¼
Int. Harv. of N. J., com.	112 -115	Pa. Steel, pref.	98
Int. Harv. Corp., com.	79 - 80	Warwick	9½- 9⅝
Lackawanna Stl.	65 - 69½	Cruc. Steel, com.	73 - 82½
Nat. En. & Stm., com.	23½- 25¼	Cruc. Steel, pref.	113¾-115
N. Y. Air Brake	128 -136	La Belle Iron, com.	49 - 50⅜
Pitts. Steel, pref.	95½- 96	La Belle Iron, pref.	127 -127½
Pressed Stl., com.	44 - 50½	Driggs-Seabury	125 -131
Pressed Stl., pref.	99½-100⅛	Midvale Steel	60¼- 65½

Dividends

The Standard Screw Company, regular semi-annual, 3 per cent on the common stock, and an extra 3 per cent. The regular semi-annual 3 per cent on the class A preferred and 3½ per cent on class B have also been declared. All dividends are payable July 1.

The Westinghouse Electric & Mfg. Company, regular quarterly, 1½ per cent on the common stock and 1¾ per cent on the preferred stock, common payable July 31 and preferred July 15.

The Sullivan Machinery Company, regular quarterly, 1½ per cent, and extra 1 per cent, payable July 15.

Manning, Maxwell & Moore, Inc., regular quarterly, 1½ per cent, and extra 1½ per cent, payable June 30.

The Scovill Mfg. Company, regular quarterly, 2 per cent, and extra 10 per cent, payable July 1. This makes 52 per cent paid in dividends thus far this year.

The American Window Glass Machine Company, 12 per cent on the preferred stock, payable July 10. This makes the fourth declaration on account of accumulated dividends.

The General Fireproofing Company, regular quarterly, 1¾ per cent on the preferred and 1¾ per cent on the common stock, payable July 1.

The Carbon Steel Company, 4 per cent on the first preferred stock, payable July 5, and 4 per cent also on the first preferred, payable Jan. 5, 1917. These are the first dividends declared by this company since 1908.

An automatic pulmotor for resuscitation has been put on the market by the Draeger Oxygen Apparatus Company, 422 First Avenue, Pittsburgh, Pa. A feature of the apparatus, aside from its light weight, 12 lb., is the use of valves with indicators to measure the inhalation and exhalation pressure exerted in the lungs. It is explained that the operator does not attempt to regulate the volume of air exchanges or the rate of respiration, these being controlled by the patient's lung capacity just as in natural breathing; instead he simply moves the valve lever handle either to the right or left for inhalation or exhalation when the gages show him that the proper and natural lung pressure for either case has been reached.

The Bureau of the Mint and the United States Geological Survey have issued a joint statement of the production of gold and silver in the United States in the calendar year 1915. The gold production was $101,035,700, against $94,531,800 in 1914. The silver production in 1915 was valued at $37,397,300.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.50c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft	1.55

No charge for cutting to lengths 3 ft. and over.

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 2.90c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

Quality Extras

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50

Marine steel, special extras and prices on application.

Gage Extras

Rectangular, ¼ in. thick, over 6 in. wide to 100 in. wide	Base
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	35

Up to 72 in., not less than 10.2 lb. per sq. ft. will be considered ¼ in.
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.
Over 72 in., ordered weight 3/16 in., take No. 8 price.
Over 72 in., ordered weight No. 8, take No. 10 price.

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.

Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85

Half circles take circle extras.
Sketches, not over four straight cuts, inc. straight taper .10
Sketches having more than four straight cuts .20
Plates sheared to a radius take complete circle extras.

*Including extra for width.

Wire Rods.—Including chain rods, $50 to $55.

Wire Products.—Prices to jobbers, effective May 1: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, $2.45; galvanized, $3.15. Galvanized barb wire and staples, $3.35; painted, $2.65. Wire nails, $2.50 to $2.60. Galvanized nails, 1 in. and longer, $2 advance over base price; shorter than 1 in., $2.50 advance over base price. Cement-coated nails, $2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	6 to 9	10	11	12&12½	13	14	15	16
Annealed	$2.50	$2.55	$2.60	$2.65	$2.75	$2.85	$2.95	$3.05
Galvanized	3.20	3.25	3.30	3.35	3.45	3.55	4.00	4.10

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from April 21, 1916, all full weight pipe:

Butt Weld

Steel			Iron		
Inches	Black	Galv.	Inches	Black	Galv.
⅛, ¼ and ⅜	63	30½	⅛ and ¼	52	19
½	67	46½	⅜	53	20
¾ to 3	70	50½	½	57	33
			¾ to 1½	60	38

Lap Weld

2	65	45½	1¼	48	26
2½ to 6	68	48½	1½	54	33
7 to 12	65	44½	2	55	34
13 and 14	53½	..	2½ to 4	57	37
15	51	..	4½ to 6	57	37
			7 to 12	56	36

Reamed and Drifted

1 to 3, butt	68	48½	¾ to 1½, butt	55	32
2, lap	63	43½	1¼, lap	43	20
2½ to 6, lap	66	46½	1½, lap	49	27
			2, lap	50	28
			2½ to 4, lap	52	31

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	59	35½	⅛, ¼ and ⅜	52	29
½	64	45½	½	57	38
¾ to 1½	68	49½	¾ to 1½	61	40
2 to 3	69	50½			

Lap Weld, extra strong, plain ends

2	63	44½	1¼	50	28
2½ to 4	66	47½	1½	55	34
4½ to 6	65	46½	2	57	37
7 to 8	61	40½	2½ to 4	59	40
9 to 12	56	35½	4½ to 6	58	39
			7 to 8	52	33
			9 to 12	47	28

Butt Weld, double extra strong, plain ends

½	55	38½	½	44	26
¾ to 1½	58	41½	¾ to 1½	47	29
2 to 2½	60	43½			

Lap Weld, double extra strong, plain ends

2	55	38½	1½	44	25
2½ to 4	57	40½	2	44	25
4½ to 6	56	39½	2½ to 4	46	30
7 to 8	51	30½	4½ to 6	45	29

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.
The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Sheets.—Makers' prices for mill shipments on sheets, of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	2.95 to 3.20
Nos. 9 to 10	3.00 to 3.25
Nos. 11 and 12	3.05 to 3.30
Nos. 13 and 14	3.10 to 3.35
Nos. 15 and 16	3.20 to 3.45

Box Annealed Sheets, Cold Rolled

Nos. 17 to 21	2.70 to 2.80
Nos. 22 and 24	2.75 to 2.85
Nos. 25 and 26	2.80 to 2.90
No. 27	2.85 to 2.95
No. 28	2.90 to 3.00
No. 29	2.95 to 3.05
No. 30	3.15 to 3.25

Galvanized Sheets of Black Sheet Gage

Nos. 10 and 11	3.60 to 3.75
No. 12	3.70 to 3.85
Nos. 13 and 14	3.70 to 3.85
Nos. 15 and 16	3.80 to 3.95
Nos. 17 to 21	3.95 to 4.10
Nos. 22 and 24	4.05 to 4.20
Nos. 25 and 26	4.20 to 4.35
No. 27	4.45 to 4.60
No. 28	4.60 to 4.75
No. 29	4.75 to 4.90

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from April 15, 1916, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1¼ in.	35	1½ in.	27
1¾ and 2 in.	47	1¾ and 2 in.	39
2¼ in.	44	2¼ in.	36
2½ and 2¾ in.	50	2½ and 2¾ in.	42
3 and 3¼ in.	55	3 and 3¼ in.	47
3½ to 4½ in.	56	3½ to 4½ in.	48
5 and 6 in.	49	5 and 6 in.	41
7 to 13 in.	46	7 to 13 in.	38

Locomotive and steamship special charcoal grades bring higher prices.
1¾ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.
2 in. and larger, over 22 ft., 10 per cent net extra.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York		Tin,	Lead		Spelter	
		Electro-	New	New	St.	New	St.
June	Lake	lytic	York	York	Louis	York	Louis
21	27.75	27.00	40.00	6.70	6.55	12.25	12.00
22	27.75	27.00	39.75	6.85	6.70	12.00	11.75
23	27.25	26.50	40.00	6.85	6.70	12.00	11.75
24	27.25	26.50	....	6.85	6.70	12.00	11.75
26	27.25	26.50	39.50	6.85	6.70	11.75	11.50
27	27.25	26.50	39.00	6.80	6.65	11.75	11.50

NEW YORK, June 28, 1916.

Copper is dull at nominal prices. Tin is lower but the week has been slightly more active than the preceding one. Lead shows easiness after firming up a little. The decline in spelter is unchecked and but little is moving. Antimony is dull and lower.

New York

Copper.—The market continues slow, with hardly enough drift to establish prices. Those which are quoted are made by offerings of resale copper which find no takers. Lake is in an even worse position than electrolytic, if that is possible, and it follows that all quotations are nominal. The foreign demand for brass and copper products, such as sheets and rods, is quiet as compared with a few weeks ago, and the makers of copper sheets in particular are beginning to look for future business. Brass sheets and rods are still difficult to get promptly. Electrolytic copper in London is down to £130. Altogether there is little of interest in the market, which is being left almost entirely to second hands because of the sold-up condition of the producers. The exports this month, including yesterday, total 29,256 tons. The total exports of brass bars, plates, etc., for four months of this year total 29,591 tons, as compared with 11,281 tons in the same period of last year. Electrolytic is nominal at 26.50c., cash, New York, and Lake nominally 27.25c.

Tin.—The week has been dull, yet a little more was done than in the preceding week. On June 22 some moderate sales of futures were quietly made direct to consumers, but not a great deal was taken. The market has been unsettled by offerings of Banca tin at ½c. to 1c. below the price of Straits. Yesterday the metal was dull and prices were drooping. It is not believed that there will be any noteworthy activity until conditions are more settled. The spot quotation for Straits yesterday was 39c. The arrivals this month, including yesterday, are heavy, amounting to 5420 tons, while there is afloat 2237 tons.

Lead.—About the middle of last week foreign buyers took a few thousand tons which imparted a better tone to the market, but domestic consumers did not fall in line and quotations are weaker again at 6.80c., New York, and 6.65c., St. Louis. The situation is mixed and the outlook seems to be for a further decline unless the demand from abroad is renewed. In fact, the crux of the whole situation, as far as prices are concerned, is that they cannot be maintained without a good export demand. The exports this month, including yesterday, total 1849 tons.

Spelter.—Quotations have continued to decline in a manner that is a great disappointment to the trade inasmuch as many had predicted a turn toward higher levels before this. The New York quotation yesterday was about 11.75c. for spot, with a sale of a round lot reported at a price equal to 11.62½c., New York. July is about 11c. to 11.25c.; August at about 10.50c. to 10.75c., New York. The demand from both domestic and export buyers is almost nil, and it is hardly believed that the bottom of the market has been touched. The St. Louis quotation yesterday was about 11.50c. Good buying by galvanized sheet mills is in prospect when the market steadies itself sufficiently to cause them to take hold. The exports this month, including yesterday, total 4078 tons.

Antimony.—Except for small lots, buyers have shown no interest and the quotation for Chinese and Japanese grades has sagged to 17.50c. for quantities ranging from 5 to 10 tons. Smaller lots might command 18c. There is keen competition to get what little business is stirring.

Aluminum.—The quotation for No. 1 virgin aluminum, 98 to 99 per cent pure, is a little easier at 62c. to 64c.

Old Metals.—The market is still declining. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	23.50 to 24.50
Copper, heavy and wire	23.00 to 24.00
Copper, light and bottoms	19.00 to 20.00
Brass, heavy	13.50 to 14.00
Brass, light	11.00 to 11.50
Heavy machine compositions	17.75 to 18.25
No. 1 yellow rod brass turnings	13.50 to 14.50
No. 1 red brass or composition turnings	14.50 to 15.50
Lead, heavy	6.00
Lead, tea	5.50
Zinc	9.00 to 10.00

Chicago

JUNE 26.—Prices at which antimony may be had here are relatively high as compared with the Eastern market. The slump in copper, lead and zinc quotations is pronounced. Tin, which had dropped sharply, recovered some of the decline at the end of the week. We quote: Casting copper, 24.50c.; Lake copper, 27.50c.; tin, carloads, 40.75c., and small lots, 42.75c.; lead, 6.75c.; spelter, 12c.; sheet zinc, 19c.; Cookson's antimony, 50c.; other grades, 22c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 18.50c.; copper bottoms, 16.25c.; copper clips, 17.25c.; red brass, 16c.; yellow brass, 12c.; lead pipe, 5c.; zinc, 6c.; pewter, No. 1, 20c.; tinfoil, 25c.; block tin pipe, 30c.

St. Louis

JUNE 26.—Non-ferrous metals have been weaker, with comparatively little actually doing at the lower prices. Closing quotations to-day were as follows: Lead, 6.50c. bid, 7c. asked; spelter, dull, 11.75c. bid and 12c. asked, with deferred deliveries even lower; tin, 41c.; Lake copper, 28c. to 29c., according to delivery; electrolytic copper, 27.50c. to 28.50c.; Asiatic antimony, 24c. to 25c. In the Joplin ore district zinc blende was firm, despite the sagging tendency in the metal, this being largely due to the floods which have filled a considerable number of mines. The top price for 60 per cent. zinc blende was $90 per ton, with the best premium settlement at $92.50 and the average for the district $78 per ton, second grades having sold as low as $70. Calamine ranged from $52.50 to $65, with the average for the week $53. Lead ore was lower, selling at $77.50 for 80 per cent, with the average of the district for the week $76. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8.50c.; heavy yellow brass, 11.50c.; heavy red brass and light copper, 15c.; heavy copper and copper wire, 18c.; zinc, 7.50c.; lead, 5c.; tea lead, 4c.; pewter, 25c.; tinfoil, 32c.

Italian producers of or dealers in iron, steel, copper, brass and other copper alloys, German silver, lead, aluminum and scrap are ordered by the government to sell these only to army authorities. Contracts already made with other parties can only be executed by permission of the war office, with no claim for compensation if consent is withheld. Infringement of the order is punishable by fine and imprisonment.

The Henry Vogt Machine Company, Louisville, Ky., is completing the installation of a full automatic sprinkler system, for which the Rockwood Sprinkler Company is the contractor. The whole plant is covered, 5000 sprinkler heads being provided for. This is said to be one of the few machinery plants in the country sprinkled throughout.

Articles of incorporation were filed June 22 by the Wisconsin Rag & Metal Company, Milwaukee, Wis. The capital stock is $25,000 and the corporators are Max Wishnefsky, Emil Hersh and B. Wishnefsky, who have been conducting a general scrap business at 427-429 Fourth Street, Milwaukee, for several years.

A Potash Plant at Buffalo

The Buffalo Potash & Cement Corporation, a recently incorporated company capitalized at $1,400,000, is building a plant for the manufacture of potash and cement on Buffalo River and the Erie Railroad, Buffalo, N. Y., adjoining the plant of the Buffalo Union Furnace Company. The first of ten units which will constitute the plant will be finished and in operation about Aug. 1, with a daily capacity of 15 to 20 tons of potash and 1000 bbl. of cement. The potash will be produced by a patented process, and it is stated this will be the first production of this commodity in commercial quantities and in an economical manner in the United States. Potash supplies used in this country were imported from Germany before the war shut off that source.

The new corporation experimented at Catasauqua, Pa., for several months before deciding to undertake the production of potash in large quantities, and chose Buffalo as the site of its plant because of the advantages of that city for the assembling of materials and the distribution of product. Briefly stated, the method of securing the potash is to heat the materials—principally feldspar and limestone—to approximately 1400 deg. Fahr., at which temperature the potash escapes in fumes. The gases are precipitated by cooling, and potash is the result. The feldspar and limestone, which have melted and fused, are afterward powdered and the result is cement. Blast-furnace slag will be used to some extent.

The Niagara frontier is rapidly becoming one of the most important centers of the chemical and dye industries, and Buffalo and Niagara Falls concerns use potash in large quantities. One of the officials of the new corporation states that a comparatively large proportion of the output of its plant is expected to be taken by these local industries. The officers of the company are: G. M. Cumming, president; Lee B. Durnstine, vice-president; R. H. Kinnear, secretary and treasurer, all of New York City. Frank Amsden, formerly in charge of the Federal blast furnaces in Chicago, is general manager and H. E. Brown of New York City is chemical director.

Induction Electric Steel at Lebanon, Pa.

The two 20-ton induction electric steel furnaces of the American Iron & Steel Mfg. Company were successfully started last week and several heats of high grade and low carbon steel have been made, averaging below 0.02 per cent in sulphur and phosphorus. It is reported that physical tests of the steel show unusually good properties. Inability to secure Austrian magnesite made former efforts to make steel in these furnaces unsuccessful, but it is believed that a domestic magnesite has now been found that will suffice, at least until the Austrian can be secured. J. Schoenawa, of Germany, is in charge of the starting of the furnaces.

The First Rennerfelt Heat

The first heat from one of its two 4-ton Rennerfelt electric steel furnaces was taken out by the Old Dominion Iron & Nail Works Company at Richmond, Va., on Friday, June 23, and it has been successfully operating since. The other furnace will be put in as soon as some necessary electrical equipment has arrived. Alex Paulsson of Sweden is in charge of the starting of these furnaces. This is the first Rennerfelt furnace installed in this country and the very first of that capacity to make steel, though larger ones are being built.

The Grant Iron & Metal Company, 292-316 Franklin Street, Detroit, Mich., has acquired six and a half acres on the Michigan Central Railroad in that city for the purpose of establishing a new yard for the handling of scrap iron. The company will add considerable machinery to that now on hand, and when the yard is equipped it is expected to be one of the most complete in the country. It will have a railroad frontage of 1100 ft. and six tracks will run through the yard.

Pacific Coast Rates Advanced

WASHINGTON, D. C., June 27.—The Interstate Commerce Commission has rendered a decision granting the petition of the Spokane Merchants' Association et al. for the cancellation of orders heretofore made authorizing lower rates to Pacific coast terminals than to intermediate points. This petition was based upon the allegation that by reason of slides in the Panama Canal and the increased demand for shipping which has arisen in consequence of the European war, the water competition, which has heretofore warranted certain relatively low rail rates from Eastern defined territories to the Pacific coast, has in large part disappeared. These low rates applied on an important list of iron and steel articles known as schedule C shipped from Pittsburgh and related points to Pacific coast terminals.

The commission finds that the unprecedented freight rates which are being paid for ocean transportation between this and foreign countries have attracted to that service practically all of the ships, regular or irregular, which have been heretofore engaged in the coast-to-coast service. It is admitted that these conditions are temporary and that how long they will last is problematical. As the situation now stands, however, the commission finds the rail rates on all these schedule C commodities from Eastern territories to Pacific coast terminals are lower than the present conditions warrant. In canceling these rates the commission says:

> We shall, therefore, rescind, effective Sept. 1, 1916, those portions of our orders relating to the schedule C commodities and require that the rates on these commodities from Eastern defined territories to Pacific coast terminals be adjusted effective on that date in accordance with the terms of our order respecting the schedule B commodities. The order responding to application No. 10,336 respecting rates on iron and steel articles from Pittsburgh and related points will likewise be rescinded, effective Sept. 1, 1916.

The commission adds that if conditions should again materially change so as to justify such action, petitions for future orders will be received and dealt with as the circumstances then appearing may warrant.

W. L. C.

Coke-Oven Accidents in 1915

Reports received by Albert H. Fay, Bureau of Mines, Washington, D. C., from the operators of coke ovens in the United States show a gratifying decrease in the number of fatalities and injuries in 1915 as compared with 1913 and 1914. The number of men killed in 1915 was 38 as compared with 45 in 1914 and 46 in 1913. The total number of men reported employed in 1915 was 31,060 as compared with 22,313 in 1914. The fatality rate in 1914 was 2.02 per 1000, while in 1915 it was 1.22. The injury rate in 1914 was 98.10 per 1000, while in 1915 it was 91.82.

The report represents 248 plants or companies, showing 55,112 ovens in operation as compared with 49,895 in 1914. There were also reported 98 plants idle. The average number of days active in 1915 was 303 as compared with 286 in 1914 and 288 in 1913. This report gives for the first time separate accident data for beehive and by-product ovens and indicates a greater hazard for the latter than the former.

Hess Electric Steel Works Starting

Frank H. Johnson, 208 South LaSalle Street, Chicago, has been appointed Western sales agent for the Hess Steel Corporation, Baltimore, Md., for the sale of electric steel ingots, billets and bars of both carbon and alloy steel. This company plans to add two units to the present Heroult furnace installation. It expects to put its rolling mills in operation July 1.

The ore carrier, T. H. Wickwire, Jr., of the Boland & Cornelius fleet, arrived at the plant of the Wickwire Steel Company on the Niagara River, Buffalo, June 23, with a cargo of 9,893 tons of ore. This is the largest load of ore ever taken through the United States ship canal lock at Black Rock Harbor and down the Niagara River.

Steel Foundry Conditions at Chester, Pa.

The one converter and six open-hearth steel foundries at Chester, Pa., could operate at full capacity so far as orders are concerned were it not for labor difficulties. Not only is common labor hard to get and commanding high wages, but it is not more than four-fifths efficient. Some of the foundries have had strikes in various departments which have seriously interfered with regular operations. Prices, however, are profitable and the demand very strong for both large and small castings.

The ferromanganese situation has been greatly relieved. Practically every plant is well covered with actual supplies and by contract. One or two were obliged to buy some months ago in the open market at $400 per ton because of non-delivery on contracts. Spiegeleisen is still being used at one plant, replacing about 25 per cent of the usual charge of ferromanganese.

The Penn works of the Penn Marine & Ordnance Castings Company has recently made some very large locomotive frames of carbon steel weighing over 13,000 lb. each and not long ago it shipped a bed-plate for a large compressor which weighed over 101,000 lb.

The Atlantic Steel Castings Company, which started its new foundry last November, has been operating continuously. Its 5-ton oil-burning open-hearth furnace has made over 460 heats of excellent acid steel averaging below 0.04 in sulphur and phosphorus. It specializes in small castings and has made a large number of small driving wheels for Russian locomotives.

Excellent results are reported by the Eagan-Rogers Steel & Iron Company in the use of the Stoughton oil-burning cupola, the sulphur content of the steel being low.

The demand for cast-steel anchors is large and several foundries have all the orders they can fill. One is making an anchor per day.

The Witherow Steel Company to Enlarge

The Witherow Steel Company, which has been operating a plant on the South Side, Pittsburgh, has had such growth in its business that its capacity needs to be greatly enlarged. With this in view, it has increased its capital stock from $50,000 to $400,000 and has purchased over seven acres on Neville Island, Pittsburgh, on which it will build a new plant. It has bought a steel building 150 x 250 ft., and another 60 x 275 ft., which are now being erected on the purchased site, and will install a 14-in. and a 9-in. mill for rerolling rails and billets into merchant bars, flats, angles, channels and other small shapes. A heating furnace, designed by the company, is being built by the George J. Hagan Company. The complete equipment of cranes, shears, conveyors, cooling beds, etc., has been bought. The company expects to have the new plant completed and in operation about Oct. 1. The Dravo Contracting Company, Pittsburgh, has the contract for the building foundations. The capacity of the plant will be 30,000 to 35,000 tons per year. W. P. Witherow is president and general manager; L. J. Lind, vice-president and sales manager; E. L. Messler, vice-president and general superintendent, and W. G. Watt, secretary and treasurer. The general offices of the company are in the Keystone Building, Pittsburgh.

New Electrical Steel Enterprise

The United States Electrical Steel Company, organized with a capital of $125,000, has secured a site of 10 acres at South Connellsville, Pa., on which it proposes to build a plant for making steel. The company has placed a contract for one 10-ton Grunwall-Dixon electric furnace with the John A. Crowley Company, New York City, and will buy its power from the West Penn Traction Company. It will also add hot and cold sheet mills for making electrical sheets. Robert Lock, who is now president of the Apollo Steel Company, Apollo, Pa., is president and general manager of the new company, and Frank E. Markell is treasurer. The directors are Robert Lock, Apollo; W. E. Moore, Pittsburgh, and Worth Kilpatrick, Frank E. Markell, Robert Norris and F. T. Evans, all of Connellsville.

St. Louis Blast Furnace to Blow In July 1

The Mississippi Valley Iron Company, St. Louis, is preparing to blow in the rehabilitated stack of the St. Louis Furnace Company July 1. One new stove has been built and the others completely relined, a Brassert-Bacon gas washing plant has been installed and new trestles have been built, an expenditure of about $250,000 having been made. The stack will continue to be hand-charged, lack of time preventing the erection of a skip hoist. Basic iron will be made, with possible intermittent periods on spiegeleisen and ferromanganese. It is expected that the various deposits in Missouri and the company's mine at Waukon, Iowa, in which there is estimated to be 10,000,000 tons of commercial ore, will supply ore sufficient for continuous operation. As a reserve supply the company has purchased about 100,000 tons of Baraboo and Mesaba ores to be shipped all-rail to St. Louis.

The Waukon ore is a brown hematite containing intimately mixed silicates. By kiln treatment and subsequent roasting at moderate temperature the ore is dried and converted into a red hematite averaging 55 per cent iron and 14 per cent silica, with a 60 per cent recovery of the treated material. The mine is not yet producing largely, because of mechanical difficulties, the plant not being adjusted to conditions of continuous production. The all-rail freight to St. Louis is $1.60, but there are plans for barge shipment of the ore from the railroad delivery point on the river in Iowa, direct to the furnace, which has dock frontage on the river at St. Louis. The company is now completing the first of a fleet of 35 steel river barges. Some of these will be available for the transportation of ore, though the building of the barge fleet had its impetus in the movement to develop the river freight between St. Louis and New Orleans. These barges are self propelled, have a capacity of 1600 tons, are 43 ft. beam by 240 ft. long, have a speed of from 9 to 13 miles per hour and draw only a little over 7 ft. of water. Docks especially equipped for the handling of freight into and out of the barges mechanically are a part of the plan in contemplation.

To Start Big Stone Gap Furnace

The Kelly & Irvine interests will rebuild and operate the Union furnace at Big Stone Gap, Va., which was acquired in 1911 by L. M. Williams of Richmond. The same interests are also owners of the Josephine coking plant near Intermont, in Wise County, Va., and have extensive iron ore lands in Wise and Lee counties. It is stated that the properties are to be combined under one ownership, to be known as the Intermont Coal & Iron Corporation. The company will issue bonds on all its properties for sufficient capital to enlarge and rebuild its plants. The bonds were subscribed for last week, it is stated, principally by Richmond capitalists. The furnace there has been idle since 1907. Mining will be resumed at the different iron mines. It is the expectation that pig iron can be shipped within 60 days. R. T. Irvine of Big Stone Gap is president of the company and Dr. J. W. Kelly, secretary and treasurer. H. H. Maury of Anniston, Ala., will rebuild the furnace and manage the plant.

New Blast Furnace at Steelton

Plans have been made for the building of a 500-ton blast furnace at the Steelton, Pa., plant of the Pennsylvania Steel Company. It will take the place of the old No. 3 furnace which will be completely dismantled. Two gas-driven blowing engines have been ordered from the Bethlehem Steel Company. In connection with the general improvements of the blast furnace department at Steelton a new ore storage crane has been contracted for and the ore storage yard has been extended several hundred feet.

The Northwestern Iron Company, First National Bank, Milwaukee, Wis., is preparing to duplicate the battery of 36 by-product coke ovens now in use at its blast furnaces at Mayville, Wis., so that a supply of coke sufficient for both stacks will be available without shipping fuel from Milwaukee. The installation will include benzol apparatus.

PERSONAL

Chairman E. H. Gary of the United States Steel Corporation will leave New York July 3 on a three months' vacation tour of the Orient. Sailing from Vancouver July 13, he will visit the Philippines and afterward make a considerable stay in China and Japan.

President E. G. Grace of the Bethlehem Steel Company, in the absence of Charles M. Schwab, who has been ill at White Sulphur Springs, formally presented on Saturday, June 24, to the employees of the company and to the Bethlehem district boroughs the new athletic field which is the gift of Mr. Schwab. There are nine acres of ground, on which various tracks and playgrounds have been laid out and a field house gymnasium and a brick, concrete and steel grand stand will be built. The presentation followed a parade in which 55 departments of the Bethlehem works were represented, each demonstrating by means of floats and papier mache forms its principal products.

R. H. Sweetser, who resigned the presidency of the Thomas Iron Company, Easton, Pa., some months ago, naming July 1 as the date, was requested at a meeting of the directors held at Easton, June 23, to continue as president until Aug. 1 and has consented to do so.

F. A. Burr, for the past 14 years general manager of sales of the Tennessee Coal, Iron & Railroad Company, Birmingham, Ala., leaves that company July 1 to become general manager of sales of the Aetna Explosives Company. He will be succeeded by Willard Wilson, who for years has been assistant manager of sales. The Tennessee Company, in parting with Mr. Burr, expressed its regret cordially and officially.

Walter Newbold Walmsley has been made general manager of the Alabama Power Company. Birmingham, Ala., succeeding F. H. Chamberlain, who recently resigned to accept the management of important chemical works elsewhere. Mr. Walmsley is experienced in large railroad and other engineering work, having been engaged in construction in South America for the past ten years.

James T. McCleary, secretary American Iron and Steel Institute, New York, addressed the Pittsburgh Chamber of Commerce at a noonday luncheon meeting June 20 on the need of an intelligent national policy for American business interests.

Louis E. Strothman, manager and chief engineer of the pumping department of the Allis-Chalmers Mfg. Company, Milwaukee, Wis., was elected president of the Engineers' Society of Milwaukee at the annual meeting on June 21. Other officers elected are: Vice-president, Edward Hutchens, president Utility Mfg. Company; treasurer, M. A. Beck; secretary, Fred H. Dorner, consulting mechanical engineer. At the same time the Milwaukee section of the American Institute of Electrical Engineers elected as its chairman F. W. Ells, secretary and chief engineer Northwestern Mfg. Company; secretary, Harrison Reed, electrical engineer Cutler-Hammer Mfg. Company.

W. S. Haney has been made assistant superintendent of the Penn works of the Penn Marine & Ordnance Castings Company, Chester, Pa.

F. C. Hinkey is superintendent of the Thurlow plant of the American Steel Foundries at Thurlow, Pa. He was formerly located at the East St. Louis plant of the same company.

John H. Deeley has been appointed superintendent of the plate mills of the A. M. Byers Company at Girard, Ohio, succeeding H. L. Wood, who has been made general superintendent of the mills of the Susquehanna Iron & Steel Company at Columbia, Pa., leased several months ago by the first-named company.

E. L. Messler, general superintendent of the Soho and Eliza blast furnaces of the Jones & Laughlin Steel Company, Pittsburgh, has resigned to become vice-president and general superintendent of the Witherow Steel Company, which is building a new plant on Neville Island in that city.

J. G. Butler, Jr., Youngstown, Ohio, has been made a director of the American Vanadium Company of Pittsburgh, with general offices in New York.

Andrew J. Dietrich of Dietrich Brothers, structural steel fabricators, Baltimore, Md., has been elected president of the Baltimore Builders' Exchange.

J. A. Cutshaw, for the past fourteen years selling to the retail paint and varnish trade and to the carriage and automobile people of Chicago and vicinity, has joined the selling staff of the Moller & Schumann Company, varnish maker, Brooklyn, N. Y., to represent that company in the same territory. The Chicago branch held a sales convention June 17, 18 and 19. W. R. Hyde, Chicago branch manager, and Mr. Uehlinger, credit manager of the company's home office, made the leading addresses.

The Manitoba Rolling Mill Company, Ltd., Winnipeg, Canada, has appointed L. T. Walls its general sales manager, he having resigned from the Steel Company of Canada, Ltd.

C. G. Hamilton has been appointed manager of the machine-tool department of Fairbanks, Morse & Co., Inc., 30 Church Street, New York, succeeding George E. Neil, who is no longer with the company.

Effective July 1, Arthur E. Crockett, for some years manager of sales for the Standard Chain Company, but more recently with the Jones & Laughlin Steel Company of Pittsburgh, has been appointed assistant general sales manager of the chain department of the latter company.

New York Merchants' Association's Growth

The Merchants' Association of New York, which recently increased its membership from about 3400 to 5026, has re-elected for another year the officers who conducted the successful membership campaign. They are: President, William Fellowes Morgan, president Brooklyn Bridge Freezing & Cold Storage Company; first vice-president, Waldo H. Marshall, president American Locomotive Company; second vice-president, Lewis E. Pierson, chairman Austin, Nichols & Co.; third vice-president, James G. White, president J. G. White & Co., Inc.; treasurer, Silas D. Webb, chairman China & Japan Trading Company; secretary, S. C. Mead.

The increase in its resources and influence which results from the large membership will enable the association to meet demands which it has not hitherto been able to satisfy, as well as to extend some of its activities already in existence. It now has a bureau of research, a traffic bureau, a publicity bureau, a convention bureau, an industrial bureau and a membership bureau, each of which has a special field of work for the promotionof the city's interests and the extension of its commerce and trade. To these it is proposed to add a legislative bureau and a foreign trade bureau, and to increase the facilities of the convention bureau and the usefulness of the publicity bureau. The association is also planning to watch legislation, both in Washington and in Albany, for the benefit of the city of New York in general and of the members of the association in particular.

New Gas Washing and Drying Plants

Contracts for the installation of Brassert-Bacon gas washing and drying plants have been placed for the two newer blast furnaces of the Iroquois Iron Company and for two stacks of the Cleveland Furnace Company. The Bethlehem Steel Company has also arranged for the equipment of furnaces at both Steelton and South Bethlehem, Pa., with similar plants. The contracts were placed with Heinrich J. Freyn, Inc., Chicago.

Turkish manganese ore mines located near Trebizond in Asiatic Turkey have fallen into the hands of Russia, thus nullifying an agreement by which Germany was to obtain and exploit the mines.

OBITUARY

SIR H. FREDERICK DONALDSON, who was superintendent of the Woolwich Arsenal from 1903 to 1915 and who has been prominent since that time in organizing the British engineering and manufacturing resources for the production of war material of all kinds, was among those lost with Lord Kitchener by the sinking of the British man-of-war Hampshire on June 5. He was born at Sydney, New South Wales, in 1856, and was educated at Cambridge and Edinburgh universities and at the Zurich Technical School. Up to 1897 he was engaged in various engineering projects in England and abroad, including the construction of a portion of the Manchester Ship Canal. In 1897 he was appointed deputy director-general of ordnance factories and continued to serve the government in various capacities until his retirement in September of last year. Upon his retirement from Woolwich he was appointed chief technical advisor to the Ministry of Munitions and was acting in that capacity as a member of the staff of Lord Kitchener. He was a member of the institutions of Civil and Mechanical Engineers and was president of the latter in 1913 and 1914. He was a member of the British Engineering Standards Committee and chairman of the sectional committee on screw threads and limit gages.

LESLIE S. ROBERTSON, secretary since 1901 of the British Engineering Standards Committee, was among those who lost their lives in the sinking of the British man-of-war Hampshire on June 5. He was born in India in 1863. His education was received in Germany and at King's and University colleges, London. While at college he carried out some original work on cast-iron beams and was awarded a Miller prize by the Institution of Civil Engineers. From 1885 to 1892 he was engaged in various engineering work and in the latter year began private practice as a consulting engineer. Last year he placed his services at the disposal of the government in connection with the Ministry of Munitions and was appointed assistant to the director of production. It was by virtue of this appointment that he became a member of Lord Kichener's staff and was on his way to Russia when his death occurred. He was a member of the institutions of Civil Engineers and Naval Architects and of the Iron and Steel Institute.

HARLEY H. FATE, president J. D. Fate Company, Plymouth, Ohio, manufacturer of gasoline industrial locomotives and clay-working machinery, died in a hospital at Cleveland, May 27, aged 42 years. His death followed a minor operation. He was born in Crestline, Ohio. His father, John D. Fate, moved to Plymouth, Ohio, in 1882, and there established the industry which was the foundation of the J. D. Fate Company, to the presidency of which Harley succeeded upon the death of his father in 1902. The business of the company in being conducted by Harry S. Fate, who succeeded his brother as head of the temporary organization; George B. Drennan, secretary-treasurer, and H. Ray Sykes, director and acting general manager.

GEORGE YULE, one of the founders of the Bain Wagon Company, and for many years one of the most prominent manufacturers in the Central West, died at Kenosha, Wis., June 23, aged 92 years. He was a native of Aberdeenshire, Scotland, and came to America in 1840. He spent his entire business career with the Bain Wagon Company, of which he became sole owner in 1900. On Jan. 1, 1916, Mr. and Mrs. Yule celebrated their sixty-eighth wedding anniversary.

HENRY B. BROWN, founder and for many years head of the H. B. Brown Nut, Bolt & Screw Machine Company, East Hampton, Conn., now conducted by Costello Brothers, died June 15 at Woodmont, Conn., aged 82 years. He had an interesting career previous to engaging in the manufacture of machinery. He was a newspaper editor, was a minister of the Advent Church, although not active, and was a prominent leader of the prohibition party. He served throughout the Civil War in the United States Navy and was mentioned several times for distinguished services. Harry Bushnell Brown, treasurer of the McLagon Foundry Company, New Haven, Conn., is his son.

CHARLES H. JENKINS, secretary-treasurer Moran Flexible Steam Joint Company, Louisville, Ky., died suddenly June 21, while attending the conventions of the Master Mechanics and Car Builders at Atlantic City, N. J. He was 54 years old and had been connected with his company for 35 years. He was an ex-president of the American Supply & Machinery Manufacturers' Association. He leaves his widow, a son and a daughter.

ROBERT F. HOXIE, associate professor of political economy, University of Chicago, committed suicide June 22. He had recently come into prominence in industrial circles because of a study of scientific management. He was a keen student of economic, labor and social problems, and worry induced by excessive study is understood to have been responsible for his death.

LEE H. BOWMAN, for many years connected with the Carnegie Steel Company at Pittsburgh as special agent, and later vice-president and general manager of the Heppenstall Forge & Knife Company, but who resigned that position some time ago on account of ill health, died at his residence in Pittsburgh, June 26. He leaves his widow and two children.

JAMES BURTON DOAN, SR., father of J. B. Doan, Jr., who is president of the American Tool Works Company, Cincinnati, Ohio, and of the National Machine Tool Builders' Association, died at his home in that city June 24, aged 79 years.

Tapping Blast Furnaces with Electricity

The following paragraph has appeared in various British trade papers as though the practice of tapping a blast furnace with electricity were something new:

An ingenious method of tapping blast furnaces is stated to be used at the Edgar Thomson works of the United States Steel Corporation. An electric arc is drawn between an electrode and the chilled metal in the tap hole; the heat of the arc burns through the chilled metal, until the fluid contents of the furnace are reached. If during the opening operation non-conducting material is encountered, it is necessary to stop the arc and drive a steel bar through this mass. The process of melting is then continued, the arc following the bar of metal. A 250-volt circuit is used, the pressure being reduced by means of a water rheostat. A current of from 800 to 1000 amp. is ample for the operation. The apparatus used consists of a special electrode holder, electrodes, cable, a resistance, and a head shield or protector for the operator. The length of the electrode and holder is about 12 ft.

This method was used in the United States as many as 15 years ago. Still more recent practice has employed the oxy-acetylene torch for the same purpose. Its use dates back 8 or 10 years.

Engineering Foundation Plans

The Engineering Foundation, the initial endowment of which was received last year from Ambrose Swasey, Cleveland, Ohio, and is administered in the interest of scientific research and the good of mankind through the engineering profession by trustees from the national societies of civil, mining, mechanical and electrical engineers, representing 30,000 engineers in all, recently held an important meeting at which it was decided to offer the services of the foundation to the National Academy of Sciences of the United States to accomplish the federation of all the research agencies of the nation—governmental, university and private—with the object of encouraging the application of scientific principles to American industries and the employment of science in the national defense which the possibility of war renders particularly important at this time. The meeting decided to spend from $8,000 to $15,000 per year on a competent executive secretary to assist in the above organization. An important addition to the financial resources of the foundation was announced from Mr. Swasey.

Metal Recovered from Scrap and Drosses

The value of the copper, lead, zinc, tin, aluminum and antimony recovered in the United States from scrap skimmings and drosses in 1915 was $114,304,930, against $57,039,706 in 1914, a 100 per cent increase. This large gain, says the United States Geological Survey, was caused by greater recoveries and much higher average values for all metals. A large demand for metal products, particularly for those to be exported, made 1915 the most prosperous year in the waste metal trade.

The imperative demand for zinc and copper by munition manufacturers and for foreign trade made spot metal very scarce. Secondary metals not desired for these purposes were generally available for domestic uses when virgin metal could not be purchased for prompt delivery. The incentive of high prices caused all metal wastes to be more carefully saved, segregated, and refined.

The output of secondary copper, including that in brass and other alloys, was 196,000 tons in 1915 against 128,000 tons in 1914. The value of this copper and brass amounted to more than $70,000,000.

The secondary lead recovered in 1915, including that in alloys, was nearly 79,000 tons, an increase of 28,000 tons, a quantity exceeded by the primary domestic output of only three States—Missouri, Idaho and Utah.

The amount of secondary zinc recovered in 1915 was 92,575 tons. At least 4000 tons of zinc chloride and 46,000 tons of lithopone were manufactured. The zinc used in these products is derived mainly from zinc drosses and skimmings.

The output of secondary tin increased from 12,447 tons in 1914 to 13,650 tons in 1915 and was equal to 24 per cent of the tin imported as metal or as oxide into the United States.

The average price of antimony was abnormally high and the secondary recoveries in 1915 amounted to 3102 tons, valued at $1,811,568, an increase in quantity of 355 tons and in value of about $1,367,000.

Aluminum was both scarce and very high priced the latter part of 1915 and the secondary metal recovered, 8500 tons, was valued at $5,802,000.

Melting Scrap Without Forming Slag

Melting scrap and preventing the formation of oxide slag, thereby not only saving both the iron and also special alloys in the scrap but also reducing wear and corrosion of the lining of an electric furnace is covered by a patent (U. S. 1,185,395—May 30, 1916) granted to Albert E. Greene of Chicago. The absence of slag when pouring the metal is also another feature. Essential conditions are the use of a reducing gas, forced into contact with the metal, or into the furnace chamber in proximity to the metal during melting, and an electric furnace. Steel scrap, preferably so far free from phosphorus and sulphur as to need no further refining, is charged into the furnace containing the molten metal already present to form the basis of the charge and to permit of the furnace taking power. Any rust forming a slag is said to be reduced by the gas, and the scrap melted with practically no oxidation or formation of slag and therefore essentially in a deoxidized condition. The process, it is claimed, is especially advantageous in melting manganese steel scrap and ferromanganese or ferroalloys, as well as alloy steels.

The Western Crucible Steel Casting Company, Minneapolis, Minn., recently purchased from the Snyder Electric Furnace Company, Chicago, a 400-kw. furnace capable of melting 2800 lb. of steel in 24 hr. The Western Crucible Steel Casting Company is at present remodeling its foundry, preparatory to the installation of this furnace.

The Steel Products Company, Cleveland, Ohio, maker of automobile parts, has absorbed the Metals Welding Company, Cleveland, and the Michigan Electric Welding Company, Detroit. The three companies which have been affiliated will have a capital stock of $4,000,000.

Chromium as a Self-Hardening Factor in Steel

Discussing chromium steel before the annual meeting of the Iron and Steel Institute in London, England, May 4, 1916, in a paper "Initial Temperature and Critical Cooling Velocities of a Chromium Steel," Prof. C. A. Edwards (Manchester University), J. N. Greenwood and H. Kikkawa stated that it is well known that the element chromium is widely used in the metallurgy of the so-called special steels. In most instances, however, another specially added element is also present, and this fact often makes it difficult to determine the exact function of the chromium and its influence on the physical properties of the steel when subjected to varying heat treatment. Although chromium is more commonly used with tungsten, nickel or manganese, etc., there can be no doubt that it plays a very important rôle. The object of the paper, the authors say, is to draw attention to a long series of experiments which clearly illustrate how remarkably sensitive our particular chromium steel is to what are really very slight variations of treatment. The steel used in the experiments had the following composition:

	Per Cent
Carbon	0.63
Silicon	0.07
Manganese	0.17
Chromium	6.15

The authors offer the following conclusions derived from their experiments:

1. The evidence contained in the present paper confirms the contention that chromium imparts the property of self-hardening to steel.

2. This property of self-hardening is governed by the rate of cooling.

3. The critical cooling velocities which produce hardening vary with the initial temperature, being much slower as the temperature is raised. The extent of this variation has been determined for a wide range of temperature.

4. The appearance of self-hardening coincides with the presence of large quantities of martensite, and a diminution in the magnitude of the carbide thermal change.

5. The maximum hardness was obtained when the thermal transformation had been entirely prevented, and when this was accomplished the steel was purely martensitic in structure.

6. While, with the chromium steel which has been used, the cooling rates which produce hardening are extremely slow as compared with those which are obtained in the hardening of carbon steels by quenching, the two operations are fundamentally the same. In other words, a given rate of cooling which might be regarded as slow for carbon steels, really constitutes quenching in the case of some special alloy steels.

A Rust-Preventing Compound

A rust-preventing composition has been invented (U. S. 1,185,361—May 30, 1916) by Dumitru Albu of Cleveland, Ohio. It dissolves in water into which metals may be immersed or the solution may be painted on them with the result, it is claimed, that these will not rust even after the solution has evaporated from them. Borax and benzaldehyde are the ingredients recommended in the preferred proportions of 15 oz. of borax to ⅛ oz. of benzaldehyde. This composition may be used mixed with paints, when the same results are claimed.

Manganese-ore imports into Great Britain in May were 42,068 gross tons as against 5278 tons in May, 1915, and 45,500 tons last April. The total to June 1, 1916, is 174,666 tons compared with 107,297 tons to June 1, 1915. The rate is thus 34,933 tons per month, against a 1915 average of 31,443 tons per month.

M. A. Hanna & Co., Cleveland, Ohio, has placed an order with the American Shipbuilding Company for two 10,000-ton ore boats for mining companies which they represent. These boats are for 1917 delivery.

TO GET ALLIES' WAR MATERIAL

Government Will Take Over Machine Guns by Arrangement

WASHINGTON, D. C., June 27, 1916.—The War Department has arranged with the representatives in this country of the so-called entente Allies to transfer to the United States Government considerable quantities of war material manufactured under foreign contracts but now urgently required for the equipment of troops being mobilized for service in Mexico. The most important items included in this transfer are machine guns, of which the War Department now has but 1077, or only sufficient to supply two-thirds of the regular and militia regiments assigned for service on the basis of five guns to a regiment. As the result of the lessons of the European war the War Department has decided that twelve guns should be allotted to each regiment and on this basis there is at present a deficiency of approximately 2500 guns which must be made up with the least possible loss of time.

Military experts express regret that the War Department should be obliged to introduce into the service a machine gun which with its ammunition represents a departure from the standard United States type, as it is regarded as highly desirable that all weapons and ammunition should be standardized so as to be interchangeable. Special care will be exercised, however, in assigning the new guns to segregate them carefully and to provide for adequate supplies of ammunition.

GOVERNMENT RUSH ORDERS OBVIATED

The arrangement for taking over guns and ammunition already manufactured for foreign account has obviated the necessity for the Department to invoke that provision of the act of June 3, just placed on the statute books, authorizing the President "in time of war or when war is imminent" to place orders with any individual, firm, association, company, corporation or organized manufacturing industry for any material that may be required and to compel compliance with all such orders "which shall take precedence over all other orders and contracts theretofore placed" under drastic penalties for refusal, including imprisonment for not more than three years of responsible officers and a fine not exceeding $50,000. War Department officials express the belief that the Government will be able to secure almost unlimited quantities of war material of all kinds as the result of amicable arrangements made with representatives of the Allies and that under no circumstances will the drastic requirements of the act of June 3 have to be resorted to.

NEW MUNITIONS PLANTS RULED OUT

The House of Representatives on June 24, upon a point of order by Chairman Fitzgerald of the House Appropriations Committee, refused to consider an amendment to the sundry civil bill appropriating $10,000,000 for the construction and equipment of three plants for the manufacture of munitions of war for use of the army and navy and the coast fortifications and for the purchase of suitable sites. This amendment was urged by Representative Keating of Colorado, who in support of the proposition quoted the following extract from a report recently made to the Secretary of War by the War College Division of the general staff corps:

> As a general military principle, no supply depot, arsenal or manufacturing plant of any considerable size, supported by the War Department appropriations for military purposes, should be established or maintained east of the Appalachian Mountains, west of the Cascade or Sierra Nevada Mountains, nor within 200 miles of our Canadian or Mexican borders, and steps should be taken immediately to cause to be moved depots and manufacturing plants already established in violation of this military principle.

Mr. Keating insisted that every arsenal now owned by the United States, with the exception of that at Rock Island, Ill., is located in violation of the above stated principle. Chairman Fitzgerald, however, informed the House that data before the Committee on Appropriations demonstrated that it would require an additional investment of at least $75,000,000 to enable the Government to manufacture all of the munitions of war that would be required, and under the circumstances the committee did not feel justified in authorizing so radical a departure from the policy heretofore followed.

W. L. C.

The New Tax on Munitions Profits

WASHINGTON, D. C., June 27.—The Ways and Means Committee is planning to make public the tentative draft of the omnibus revenue bill before the end of the present week. This measure is designed to raise about $200,000,000 to meet the current treasury deficit and to pay the additional cost of the enlarged plans for the national defense.

It has been decided, in lieu of a tax on war material to be paid by the manufacturer before the goods leave the factory, to impose a 2 per cent tax on the net profits of all concerns making munitions, with a graduated surtax above certain limits. It is probable that not less than 10 per cent will be imposed on profits of the largest producers.

The bill will probably be taken up in the House next week and considered under a special order from the Committee on Rules limiting debate, fixing a time for a vote and shutting off amendments except such as may have the approval of the Ways and Means Committee. House and Senate leaders confidently predict that the measure will be placed on the statute books not later than July 25, and that all its provisions, including the repeal of the documentary stamp taxes imposed by Schedule A of the emergency war revenue act, will become effective on or before Aug. 1.

In the event of a formal declaration of war Congress would probably be called upon for an immediate appropriation, possibly $100,000,000; and as the cash balance in the treasury would not justify such a draft, the sale of the Panama bonds would be the only practicable method of supplying the money without delay.

W. L. C.

Electrolytic Iron Direct from Pyrites

Electrolytic iron from iron pyrites, recovering at the same time pure sulphur, is the patented process of Axel Estelle of Hagen, Westphalia, Germany (U. S. 1,162,150). The pyrites is first subjected to distillation without access of air, as in an electric furnace, for the sublimation and recovery of the sulphur. Or it may be smelted so as to render it in acid-soluble form and at the same time recover any valuable metals contained in the ore. Hydrochloric acid is then added to the iron product, forming ferrous chloride and hydrogen sulphide. By electrolysis some of the iron is deposited, while a greater portion is converted into ferric chloride, which is passed, together with hydrogen sulphide, into an absorption tower, where the reaction yields ferrous chloride, hydrochloric acid and sulphur, the solvent thus regenerated being used again as fresh ore.

So successful has been the Goodyear Tire & Rubber Company's factory school, at Akron, Ohio, in the two years since its organization, and so great the demand for admission to its classes, that the school, heretofore open to workers in several departments, has been thrown open to all Goodyear employees who wish to improve upon their early education. Classes in common school and high school subjects have been arranged at convenient hours, so that all employees are able to take up the studies desired, irrespective of the shifts upon which they may be working. In the citizenship classes men of alien birth are taught the fundamental principles of our government, the geography of the country, and the subjects necessary to make them intelligent citizens.

The Thomas Iron Company blew out its No. 1 furnace at Hokendauqua, Pa., on Saturday, June 24, for relining.

Pittsburgh and Nearby Districts

The skelp mills of the A. M. Byers Company at Girard, Ohio, started up last week. The company's puddling plant, which has 92 furnaces, is operating, as is also the Mattie blast furnace.

The Hecla Coal & Coke Company, Pittsburgh, has filed an application at Harrisburg, Pa., for an increase in its debt limit to $500,000.

The Asbestos Protected Metal Company, First National Bank Building, Pittsburgh, has recently received some large contracts for its products. These include roofing and siding of a power house at Columbus, Ohio, for the Pennsylvania Railroad; roofing, siding, Waugh skylights and reinforced concrete construction for a large garage for the Larkin Company, Buffalo, N. Y.; a large quantity of Waugh skylight construction in a new photographic and moving picture film laboratory for the Packard Motor Car Company, Detroit; roofing and reinforced concrete roof construction for the Contact Process Company, Buffalo, which is building a new acid plant, where protected metal is particularly desirable; roofing and siding for the General Asbestos & Rubber Company, Charleston, S. C., which is putting up several buildings. It is shipping to the N. Escalante Company, Yucatan, Mexico, about 400 squares of its asbestos protected metal to be used for roofing and siding for a new rope factory. It is also receiving large orders for its products from various steel companies.

The Southwark Bronze Company, Pittsburgh, has been incorporated with a capital of $5,000 by A. R. and J. G. Basset and others.

The Vacuum Cooling Tower Company, Pittsburgh, has been organized with a capital of $100,000 by D. K. Straus, John A. Poultney and F. W. Haas, all of Pittsburgh, to build cooling towers and other products.

The R. D. Nuttall Company, Pittsburgh, is reported in the market for a 15-ton traveling crane.

The Keystone Driller Company, Beaver Falls, Pa., is in the market for a combination punch and shear.

The Carnegie Steel Company has placed an order with the Charles Ward Engineering Works, Charleston, W. Va., for a steel boat, 126 ft. long, which will be used for towing coal from its mines on the Monongahela River to the new Koppers by-product coke ovens it is building at Clairton, Pa.

A patent has been granted to J. W. Barnes, Republic Iron & Steel Company, Youngstown, Ohio, on a new design of open-hearth furnace, which, it is claimed, will lengthen the life of the furnace about 50 per cent. This result is secured by a new arrangement of valves and drafts. It is also said that the new furnace will turn out a much larger output than the ordinary furnace.

The American Sintering Company will build a plant at Haselton, Ohio, for sintering flue dust from the blast furnaces of the Republic Iron & Steel Company and the Youngstown Sheet & Tube Company. The Dwight & Lloyd sintering process will be used. The company has operated a sintering plant in Hubbard, Ohio, for some years, using the three-rotary-kiln system. The new works will consist of a main building, storage bins, conveyor building, unloading trestles, small machine shop, storehouse and office building. The work of excavating has started and it is expected the plant, which will cost about $100,000, will be completed about Sept. 1.

The Westinghouse Air Brake Company, Wilmerding, Pa., has taken an order for 1,100,000 brass time fuses, each weighing 1½ lb. It is said the order totals $6,000,000 in value.

Junzo Inouye, metallurgical engineer of the Mitsubishi Company, Tokyo, Japan, is in Pittsburgh this week, expecting to purchase blast-furnace machinery and other equipment. His company manufactures mill materials and develops copper production and shipbuilding projects.

The Youngstown Sheet & Tube Company expects to get its new by-product coke plant in operation within the next fortnight. The work of drying out the ovens was begun two weeks ago. Attached to the plant is a benzol works. The gas from the plant will be used in the mills of the Sheet & Tube Company, while the tar, ammonia, etc., will be taken care of by the Barrett Company, which is erecting a plant on the south side of the Mahoning River.

It is reported but not officially confirmed that the Crucible Steel Company of America, Pittsburgh, has received a $4,000,000 order for munitions from the United States Government.

The Labelle Iron Works, Steubenville, Ohio, expects to complete its new Koppers by-product coke plant of 94 ovens about July 1. Each oven will have a daily capacity for making about 12½ tons.

The J. M. Humphrey Mfg. Company, Brookville, Pa., with a capital stock of $10,000, has been incorporated by J. M. Humphrey, T. B. Humphrey, R. J. Reitz and M. N. Conrad to manufacture mill supplies, engines and machinery.

The General Motor Sales Company, Oil City, Pa., with a capital stock of $30,000, has been incorporated by Michael A. Garvey, Frank J. Malerich and W. Edward Walz, 608 West Second Street, Oil City, to sell and repair automobiles.

The Colonia Brick Company, Youngsville, Pa., with a capital stock of $65,000, has been incorporated by C. E. Foster, Asher Johnson and E. C. Swanson to manufacture brick and tile. The main office is at Bradford, Pa.

The Johnson Bronze Company, New Castle, Pa., which recently took over the works of the American Car & Ship Hardware Company, is planning large additions. New steel buildings will be erected to replace wooden structures. The cost of the additions and betterments is put at $85,000.

The Watt Mining Carwheel Company, Barnesville, Ohio, has increased its capital stock from $125,000 to $200,000.

The Manganese Company of America, Pittsburgh, has been incorporated with a capital stock of $5,000 by Samuel Stafford, John McKelvie and Harrison M. Fines, all of Pittsburgh, to mine and smelt manganese ore.

The Electric Metals Company, Pittsburgh, with a capital stock of $25,000, has been incorporated by J. K. Scott, J. H. McFeeley and W. S. Laird, Pittsburgh; F. B. McFeeley, G. E. Anderson, E. G. Moberh, C. M. Haymaker and J. M. Steele of Latrobe, Pa., to act as agent for the sale of pig, muck and sheet iron, steel, coal, coke and supplies.

Chester & Fleming, hydraulic engineers, Pittsburgh, are preparing plans for a 20,000,000-gal. turbine-driven pumping unit to be used as an auxiliary at the main pumping station of the city water works at Erie, Pa. Bids for this machinery will be received until July 14.

Claire furnace of M. A. Hanna & Co. at Sharpsville, Pa., which was blown out June 1, resumed blast June 24 on Bessemer iron. The stack was relined to the top of the mantel and is now in first-class shape.

The Riter-Conley Company, a subsidiary of the McClintic-Marshall Company, Pittsburgh, has leased the plant of the Ellicott Machine Corporation at Fairfield, near Baltimore, Md. The plant has been acquired to help out in contracts for steel barges for carrying oil and general cargo. It is understood that a large number of barges are already under contract to be built at this plant, which covers nearly 16 acres of ground and has 700 ft. of water front.

The forty-eighth annual convention of the American Society of Civil Engineers is meeting in the William Penn Hotel, Pittsburgh, this week, the sessions to continue until Saturday. It is estimated that fully 1000 engineers are in attendance. The address of welcome was made by Dr. John A. Brashear, past president of the American Society of Mechanical Engineers.

Corrigan, McKinney & Co., Cleveland, Ohio, will shortly begin the erection of four additional open-hearth furnaces. Their plant was laid out for 12 furnaces. Eight of these having been completed, the original plan will now be carried out. The extension to the open-hearth plant will include the installation of 10 additional Hughes gas producers and other required equipment.

MESABA STRIKE MORE SERIOUS

Most Underground Mines East of Hibbing Closed —No Dock Strike Thus Far

DULUTH, MINN., June 28, 1916.—(*By Telegraph.*)—The strike situation on the Mesaba range has grown more serious during the past week and no early settlement is in sight. Nearly every underground mine to the east of Hibbing is now closed, and it would not be surprising if the remaining underground properties on the range would be forced to close. Only a minority of the men who have left work are in sympathy with the Industrial Workers of the World and their methods, but they deemed it advisable to remain away from the mines to avoid trouble. Picketing is being practised all over the range, with the exception of one or two towns. The men at Nashwauk took a vote and decided not to strike, but it is feared that the agitators will reach there and be able to play on the sympathies of the workers. Coleraine has not been troubled thus far.

In a pitched battle between strikers and police of the Oliver Iron Mining Company a few days ago, one striker was killed and two injured. This made matters worse. The agitators have threatened to induce the dock workers at the head of the Lakes to strike. Thus far shipments have been going on as before. All of the pit mines are operating and most of the underground mines have ore in stock piles. The operators state that enough ore will be moved to keep all of the boats active. Employers will not arbitrate, as they refuse to treat with the I. W. W.

Scattered Labor Troubles

About 300 workmen at the plant of the Plume & Atwood Mfg. Company, Thomaston, Conn., went on strike June 19, demanding $3 for an 8-hr. day in place of the present minimum of 22½c. an hour and the present working schedule of 11 hr. for five days each week and 5 hr. on Saturday. The strike was followed by some disturbances. A compromise offer of a minimum of 25c. an hour and a reduction of the working schedule to 10 hr. a day was refused. The strikers have now changed their demands to a 9-hr. working day, Saturday afternoons off with pay and an hourly rate of 30c. The factory has been closed since last Monday. At the Russell & Erwin division of the American Hardware Corporation, New Britain, Conn., 40 brass molders went on strike June 19 for more pay. No definite demands were presented and the trouble will probably be of short duration.

Demanding an 8-hr. day, about 700 employees of the Harlan & Hollingsworth Corporation, Wilmington, Del., went on strike last week. It is stated, however, that the strike did not interfere with the operation of the plant.

The Interstate Foundry Company, Cleveland, Ohio, employing about 400 men, has shut its plant down entirely because of the demand by its molders for recognition of their union.

Determined efforts are being made by machine shop operators at Youngstown, Ohio, to settle the strike of their machinists, which has been on since May 1, the men demanding an 8-hr. day with 9-hr. pay. The United Engineering & Foundry Company has placed in its Lloyd-Booth shops a large number of machinists from Chicago and Cleveland, and has established a commissariat department, the men being fed and housed inside the works. The William Tod Company has sent a letter to each of its striking machinists to the effect that before filling their places they desire to give them a last chance to return to work. The company has named the working conditions under which its machinists can secure their old positions as follows: Day turn, 7 a. m. to 12 m. and 12 p. m. to 4.30 p. m.—9 hr.; night turn, 5 p. m. to 12 m. and 12.30 a. m. to 6.30 a. m. —13 hr., with 14 hr. pay; all time over these hours to be paid for at the rate of time and one-half for overtime and double time for Sundays and holidays. It is believed that a large number of the men will soon return to work. Other machine shop owners are taking action similar to the William Tod Company.

Bar-Iron Conference with Amalgamated

Failing to reach an agreement as to the rates that will prevail in the annual wage scale, the bar-iron conference, in session last week at Atlantic City, N. J., and made up of committees representing the Western Bar Iron Association and the Amalgamated Association of Iron, Steel and Tin Workers, came to an abrupt close on Saturday, June 24. James H. Nutt, Youngstown, Ohio, secretary of the Western Bar Iron Association, is reported as stating that an adjourned conference will be held within the next two weeks at either Cleveland or Detroit. As the mills governed by the union wage scale have a continuous operating agreement, they will not close down at midnight, June 30, as they otherwise would have done.

The demand of the Amalgamated Association for a wage increase for boiling or puddling equivalent to 15 per cent on the base rate was the principal point objected to by the manufacturers. The present rate for boiling under the sliding scale is $7.40 per ton. With increases promised under the average sales for May and June the rate will be advanced to at least $8.65 per ton, it is stated. The additional $1.25 per ton, which is 15 per cent of the existing rate paid for boiling, would establish a rate of $9.25, according to manufacturers' representatives, a condition unheard of in the annals of the iron trade in America.

Customs Decisions

ROUND BAR IRON

The Board of United States General Appraisers has taken favorable action on a protest filed by Gustav Lundborg against an assessment made by the collector at Boston on importations of round bar iron imported in 10-ft. lengths and measuring in diameter ¼, ⅜ and ½ in. respectively. Duty was levied at the rate of 10 per cent under paragraph 113 of the act of 1913 as wire rods, while the importer claimed entry at 5 per cent under paragraph 103 as "bar iron." It was conclusively shown in the importer's testimony that articles of the kind in controversy were recognized in the trade of this country as bar iron, and never as wire rods; that bar iron comes in lengths of a possible 16 ft. for the lighter and thinner sizes, whereas wire rods invariably come in coils of upward of 250 ft. in length. It further appeared that by reason of the shortness in length and the thickness in diameter of the articles in question they are wholly unfitted to be commercially employed for use in wire drawing.

SUGAR-MAKING MACHINERY

The board has again emphasized its determination not to depart from its rule not to admit, duty free, machinery which, while capable of use in sugar-making, nevertheless is imported for some other use. The present tariff law grants free entry to "machines used to manufacture sugar." This has led to many protests being filed claiming duty exemption to a large variety of machines closely allied to actual sugar machinery. The board's latest decision is an indication that domestic machinery manufacturers will continue to enjoy the 20 per cent protection provided for in the law. The decision just rendered showed that F. D. Canfield imported a special type machine for Rockwood & Co., Brooklyn, manufacturing chocolate, and asked free entry under the sugar machinery provision. At the hearing Mr. Canfield took the stand as leading witness for the Rockwood firm. According to him, the machines in England were employed in the preparation of sugar for use in making crackers, while in Brooklyn they were used in the preparation of sugar used in the manufacture of chocolate. Another point emphasized was that, while the machines operated on raw sugar in the present instance, they were neverthe-

lers in fact machines used in the manufacture of sugar, and fully capable of making commercial sugar from the juice of the sugar cane. Attorneys for the Government took the position that the use for which these machines were employed did not place them in the class of machines for which free entry was accorded; that they were not, strictly speaking, sugar-making machines, but that they were rather machines which manipulated sugar that was employed in the manufacture of chocolate. Judge Fischer, in his decision, coincided in by the full bench, said that in order to become entitled to participate in the benefits of the particular provision of paragraph 391 under consideration, it was absolutely essential that a machine must be shown to be a necessary part of the equipment of a sugar factory, and that it shall be used exclusively or chiefly by it. The fact that the machines in question were capable of making sugar, the board believed, was not sufficient to give free entry. "Moreover," said the decision, "what the witness believes the machine is capable of doing and what the machine is actually employed in doing are two separate and distinct propositions."

New Russian Manganese Ore District

A new Russian district producing manganese ore is attracting attention, according to M. Stromberg of Moscow, Russia, editor of the *Journal* of the Russian-American Chamber of Commerce. It is the Gaisinsk district in the province of Podolia near Hosheratovo. The natural supply, a pyrolusite, is apparently large and its distance from Odessa by rail is 221 miles. Up to the present, mining has been on a small scale, not exceeding 450 tons which has gone to southern metallurgical works.

The principal district of Russia producing manganese ore, the Caucasus, yielded, in the decade from 1904 to 1913, an average of 600,378 tons per year, or about 75 per cent of the yearly Russian output. The Nikopol district, second in importance, averaged 195,010 tons per year or 24 per cent of the total. The other districts, the Ural and western Siberia, averaged only 21,487 and 152 tons respectively in 1912. Russia ranks first in manganese ore production, supplying 37 per cent of the world's total output in the decade from 1903 to 1912, against 20 per cent from British India and 12 per cent from Brazil. In the decade from 1904 to 1913, the annual exports of manganese ore from the Caucasus averaged 680,730 tons of which 640,825 tons (93.97 per cent) was exported and 39,900 tons supplied to southern Russia.

The Jeffrey Mfg. Company, Columbus, Ohio, has opened new branch offices at Dallas, Texas, and St. Louis, Mo. The Dallas office will be located in the Commonwealth National Bank Building, and will be in charge of J. U. Jones, who has 20 years of successful salesmanship to his credit and a thorough personal knowledge of Texas and the requirements of its buyers. W. V. Cullen has been placed in charge of the St. Louis office, with headquarters in room A-21 of the Railway Exchange Building. Long experience in sales engineering work and training in the application of Jeffrey products especially qualify Mr. Cullen for handling this work.

The city assessor at Louisville, Ky., after withholding decision for some months, has ruled that the Louisville plant of the Ford Motor Company is a factory and not a mere assembling plant and therefore entitled to the five-year tax exemption allowed to new factories. The ruling means $2,500 annually to the plant. That the company proposes shortly to establish a plant for turning out farm tractors was stated to the assessor.

Tin-plate consumption in the Stavanger districts of Norway is estimated at 25,000 tons per year according to U. S. Consul Maurice P. Dunlap of Stavanger, who also says that samples of American tin received there have proved satisfactory and that large orders have resulted.

Manganese and Chrome Steels Compared

Comparative tests on chrome steel and manganese steel crusher plates, given by Frank E. Johnson, of Salt Lake City, Utah, in a communication to the *Engineering and Mining Journal* of May 20, 1916, are as follows:

Chrome Steel Jaw Plates

Installed July 4, 1910, to March 17, 1911, inclusive	
Weight of set, lb.	921
Cost, f.o.b. mill	$96.93
Tons milled during period	70,206.20
Cost per ton milled	$0.00138

Manganese Steel Jaw Plates

Installed March 18, 1911, to Jan. 22, 1912, inclusive	
Weight of set, lb.	740
Cost, f.o.b. mill	$72.62
Tons milled during period	86,478.70
Cost per ton milled	$0.00084
Difference in cost, in favor of manganese steel, per ton milled	$0.00054

Mr. Johnson also states that in another test run at another property early in 1914, chrome steel plates crushed 48,736 tons of ore and manganese steel plates 99,451 tons, the plates in each case being made from the same pattern. The tests were run by reliable men and are vouched for as absolutely correct.

As to the service obtained from manganese steel balls compared with chrome steel balls, Mr. Johnson says that there are practically no manganese steel balls used now. A recent test showed that the manganese steel balls gave slightly better service than the chrome steel, but their manufacturing cost is greater, making the latter more economical.

Another contribution by D. Lay of London, England, to the same paper, states that his experience has shown that manganese steel shells have at least double the life of those of chrome steel; that in the case of finer material the difference is not so marked and consequently the advantage lies with the cheaper chrome steel shell. As to crusher plates, there can be no question that the advantage lies with the manganese steel by a very wide margin.

Book Review

Principles and Practice of Cost Accounting. By Frederick H. Baugh. Pages, 194; octavo size. Published by the author and for sale by the David Williams Company, New York. Price, $3.

The book is apparently based on a practical experience with certain kinds of accounting. When the author's exposition is within his own experience it takes on a character and has an interest for the reader which is lacking in other passages of the book. It will prove valuable to the professional accountant who wishes to broaden his view. The author has illustrated certain principles in a clear and concise manner that is very commendable.

A decided tendency toward dogmatism mars the value of the book, particularly as a reference book for the student of accounting, or the layman. The author's desire to give a "comprehensive presentation" has not led him to give more than a bare outline of some extremely important principles, and he apparently ignores the views of recognized authorities in a number of cases where he finds they do not agree with his own ideas. For example, on page 6, referring to cash discounts, he says: "The discount allowed on invoices for prompt payment should not be deducted from the cost of material. It should be treated as other revenue and should not enter the cost work at all." Competent authorities insist that cash discounts are properly deducted to give the net cost of purchased materials. Regardless of which view one may hold, a comprehensive presentation must deal with both. Other illustrations may be found which deal too briefly with more important questions which deserve discussion. Church's machine-hour rate method is mentioned very briefly.

The American Electrochemical Society will hold its regular fall meeting in New York, Sept. 27 to 30, in conjunction with the second National Exposition of Chemical Industries which is in session during the week of Sept. 25.

Machinery Markets and News of the Works

DELIVERIES GROW EASIER

Several Foreign Countries Want Tools

New Plants and Extensions Are Fewer—Renewed Buying Movement Forecasted in the Pacific Northwest

The comparative ease with which assurances can be obtained that deliveries will be made at some definite time is evidence that the pressure on machine-tool builders is fast subsiding. At the same time there is quite generally a steady run of single tool orders which constitute a volume of business that in normal times would be considered good.

While there is little that is notable in the domestic demand, as compared with the events of a few months ago, export buying is holding up in excellent fashion, Russia continuing the leading buyer. The diverse directions from which export orders are coming are interesting, the New York market alone alluding to business done with Russia, Sweden, Italy, Spain and Honolulu.

In New York there is just a hint of apprehension among the trade over a rumored possibility that munitions makers may soon offer for resale some of the tools they purchased during the height of the war activity.

From no direction is there any report of even minor embarrassment because of the mobilization of the National Guard. Practically all employers who are temporarily losing men are assuring them that their positions will be awaiting them on their return. In Texas the industrial situation is reported to be more active despite the trouble across the border.

Plant extensions are less numerous because of the natural limit having been reached, as well as on account of the higher cost of building materials, but they are by no means terminated, as shown by several items in the various markets.

In the Pacific Northwest, inquiries and orders which the lumber mills are receiving forecast a new buying movement which will steady the market in that territory. Further price recessions are not expected.

New York

NEW YORK, June 27, 1916.

Many sellers of machine tools are inclined to call the market quiet, but the fact remains that they are doing a business which in normal times would be called good. The export trade shows increasing activity in diverse directions. Foreign shipments are easier with all countries, except Russia, and this is due not so much to any shortage of freight space, as to the red tape involved. Negotiations with Russian officials still delay shipments. As stated heretofore, it is the intention of Russian authorities to eliminate speculation in their country. Not only must the name of the ultimate consignee be proved, but it is necessary to attest that the shipment is of American origin. Russian buyers continue the most active of any foreign purchasers.

Machine-tool dealers are becoming somewhat apprehensive over rumors that munitions firms which bought large numbers of tools at the outset of the war are seeking to sell the machinery they bought. A firm making rifles and another making fuses are mentioned. It is pretty certain, however, that offerings have not yet been actually made.

The trade quite generally is submitting prices against the list of railroad shop requirements issued by the Steel Company of America, 100 Broadway.

It is understood that the Russian Railway Commission, 140 Broadway, New York, will be in the market at an early date for railroad equipment.

The Russo-Baltic Car Works Company, 1 Madison Avenue, New York, continues active.

The Honolulu Iron Works, Honolulu, Hawaii, has closed against an inquiry which has been out for some time. Several machines were purchased, including some second-hand tools which were taken because new ones could not be procured for early delivery.

One house sold a few machines for delivery to an industrial plant in Spain, and also a number for shipment to Italy, the latter being intended for a munitions plant, and purchased through an export broker. The tools for Spain were bought by a representative visiting this country.

The Wern Machinery & Engineering Company, 30 Church Street, New York, is buying equipment for a ball-bearing plant in Sweden.

The General Electric Company is inquiring for some additional equipment.

The Waclark Wire Company, Elizabeth, N. J., has taken out permits for three buildings to be erected at its Bayway plant at a cost of $110,000. The company has recently completed additions, and is to extend further. A mill building, 63 x 290 ft., will be of brick construction. An office building will be 57 x 82 ft. and a machine and carpenter shop, 52 x 141 ft., the last named to be one-story.

The Titanium Alloy Mfg. Company, manufacturer of ferrocarbon, titanium, and bronze and brass castings, is ready for bids on a two-story brick and reinforced-concrete factory, 50 x 100 ft., to be added to its plant at Sugar and Lafayette streets.

The Niagara Alkali Company, Niagara Falls, N. Y., will build a one and two-story addition to its plant at Buffalo Avenue and Union Street to cost approximately $750,000. A. W. Wetherbee is the architect and engineer.

The H. H. Franklin Mfg. Company, Syracuse, N. Y., is having plans prepared for a three-story addition, 220 x 240 ft., to be made to its plant on West Marcellus Street at an estimated cost of $250,000. H. G. Franklin is president.

The Standard Oil Cloth Company will build a one and three-story addition to its plant at Peekskill, N. Y., to cost $50,000. H. M. Garlick, 320 Broadway, New York, is president.

Walter Scott & Co., manufacturers of printing presses, South Avenue and Richmond Street, Plainfield, N. J., are reported to be planning the erection of a two-story brick addition to their machine shop to cost about $40,000. It will be 80 x 200 ft.

Plans have been prepared and bids will be received until July 3 for a sewage pumping station for Plainfield, North Plainfield and Dunellen, N. J. James T. MacMurray, Plainfield, is city clerk.

The American Elevator Company, 117 Cedar Street, New York, has recently been reorganized and will be known as the American Elevator & Machine Corporation. J. D Wilson is president and Charles Van Zandt, treasurer.

New England

BOSTON, MASS., June 26, 1916.

Fairbanks, Morse & Co., Inc., Washington Avenue and Eldredge Place, Chicago, Ill., will transfer its valve manufacturing department from its plant at St. Johnsbury, Vt., to its works at Binghamton, N. Y. The equipment for this work is now being transferred from the Vermont plant.

The Universal Winding Company, Boston, Mass., has been incorporated with a capital stock of $1,250,000 to manufacture machines, parts, tools, etc. The directors are Joseph R. Leeson, president; Robert A. Leeson, treasurer, and H. L. Rice.

The Bead Chain Mfg. Company, Bridgeport, Conn., is to

be the lessee of a factory, 60 x 120 ft., two stories, to be built by W. C. Bryant of the Bryant Electric Company. The contract has been awarded.

The Pawtucket Screw Company, Pawtucket, R. I., has begun the erection of an addition, 40 x 110 ft., to its plant on Hughes Avenue, which will enable it to double the output.

The Massachusetts Machine Company, 27 School Street, Boston, Mass., is having plans drawn for a factory and foundry, 180 x 400 ft., one story.

The Diamond Link Fence Company, 43 West Street, Boston, Mass., has awarded a contract for a factory, 150 x 150 ft., one story, to be built at Norfolk Street and Mildred Avenue.

The Ball & Roller Bearing Company, Danbury, Conn., is preparing to let a contract for a factory, 170 x 240 ft., one story.

The Clark Brothers Bolt Company, Milldale, Conn., has awarded a contract for an addition, 40 x 300 ft.

The Economy Trolley & Bushing Company, Springfield, Mass., has been incorporated with a capital stock of $100,000. The directors are Lewis J. Tetlow, president; John Aldrich, treasurer, and R. P. Smith.

The Mayo Radiator Company, New Haven, Conn., has increased its capital stock from $500,000 to $2,000,000. The purpose of the increase has not been disclosed.

The Reed Small Tool Works, Worcester, Mass., has been incorporated with a capital stock of $25,000 to make small tools, hardware, etc. E. Howard Reed is president; Edgar E. Lothrop, treasurer, and Donald D. Simonds, clerk.

The North & Judd Mfg. Company, New Britain, Conn., has increased its capital stock from $1,000,000 to $1,500,000, $250,000 of which will be issued at once and the remainder retained in the treasury. The company is having plans drawn for a power house and factory.

The Barnum Richardson Company, East Canaan, Conn., has broken ground for a factory on an 11-acre lot near the railroad station. Officials of the company have been reticent as to the character of the operations to be carried on. It owns valuable iron-ore mines in the northwestern part of the State and manufactures carwheels at its plant at Lime Rock, Conn.

The New Departure Realty Company, Bristol, Conn., has been incorporated with a capital stock of $250,000 to carry out the housing plans of the New Departure Mfg. Company. The incorporators are all officials of the latter company.

The Interstate Machine Company, New London, Conn., has changed its name to the Inter-State Products Company.

Philadelphia

PHILADELPHIA, PA., June 26, 1916.

The Silvex Company, Bethlehem, Pa., manufacturer of spark plugs and shock absorbers, will build a new factory, one story, 60 x 315 ft., with basement under one end extending back 150 ft. The plant will have a capacity of 10,000 spark plugs per day and 10,000 shock absorbers per year, with sufficient floorspace to increase the output 50 per cent without enlarging the building. W. S. Barstow & Co., 50 Pine Street, New York, are the designers and engineers.

The Luster-Jordan Company has recently acquired the plant and business of the Jordan Machine Company, Norristown, Pa. It will continue the manufacture of the Jordan lock-corner wood box machinery, and has installed additional equipment, which is being used for contract work and the manufacture of special machinery, jigs, fixtures, tools, etc. E. J. Luster is now vice-president and general manager.

The Viscose Company, Marcus Hook, Pa., manufacturer of artificial silk, will erect another plant of equal size at Roanoke, Va., to employ about 2500 persons.

The Charles E. Tucker Mfg. Company, York, Pa., has been incorporated with a capital stock of $5,000 by Charles E. Tucker, John F. Rudisell and H. B. Mehring to manufacture gages, jigs, tools and models.

The Crescent Optical Company, Philadelphia, has been incorporated with a capital stock of $15,000 by Howard H. Yocum, 2206 Locust Street; W. W. Whitaker, 229 South Forty-sixth Street, and George W. Hosfelt, Jr., 2061 York Street, to manufacture optical and photographic instruments and supplies.

The United Engine & Mfg. Company, 444 High Street, Hanover, Pa., manufacturer of electric railway repair equipment, etc., is erecting a one and one-half story stockroom, 30 x 40 ft., which will enable it to enlarge its manufacturing space.

John Braun & Sons, Philadelphia, Pa., with a capital stock of $10,000, has been incorporated by W. F. Harold Braun, Pelham, Philadelphia; Herman Stein, 1530 North Gratz Street, Philadelphia, and E. C. Worrell, 2421 North Fifty-fourth Street, Philadelphia, to manufacture lawn mowers and implements.

The Powers Company, Philadelphia, has been incorporated with a capital stock of $5,000 by J. A. and M. M. Powers, 5228 North Carlisle Street; F. Wade Powers, Stoneleigh Court, Philadelphia, to manufacture motor vehicles and equipment.

The Heishman Machine Company, Philadelphia, has been incorporated with a capital stock of $5,000 by Joseph H. Heishman, Fort Huron, Mich.; John W. Meck, Jonestown, Pa., and E. Ray Webb, Philadelphia, to manufacture milling machinery, etc.

The Elevator Safety Appliance Company, Philadelphia, has been incorporated with a capital stock of $5,000 by Edward W. Dugdale, 34 South Sixteenth Street; Horace W. Davenport, 1322 Colwyn Street, and E. F. Gallagher, 2606 Rhaun Street, to manufacture elevator safety appliances and parts.

The George F. Ott Company, Philadelphia, has been incorporated with a capital stock of $5,000 by John Limprum, 4017 North Sixth Street, Philadelphia; Otto Guessfeldt, 3426 North Carlisle Street, Philadelphia, and Ernest F. Ott, Norristown, Pa., to manufacture machinery.

The Copper Specialties Corporation, Philadelphia, has been incorporated with a capital stock of $5,000 by Chester S. Leonard, Samuel M. Kesten and W. Howard Metcalf to manufacture copper specialties.

The Whittington-Vaughn Company, Easton, Pa., has been incorporated with a capital stock of $10,000 by Joseph W. Whittington, William H. Vaughn and Newton R. Turner to manufacture vises, tools, etc.

Chicago

CHICAGO, ILL., June 27, 1916.

The last few days have brought out a number of new inquiries for shell-making equipment and several sales of tools are reported. In the principal lines of shell-making machinery, manufacturers have had opportunity to improve their position greatly as to deliveries, and in the case of some turret lathe manufacturers new business is now very desirable. No hesitancy has appeared in the manufacturing trades because of the threatening Mexican situation, and new construction seems to be even in excess of normal volume. Except for the completion of purchases on previous lists, the railroads are again one of the lesser factors in the market.

The Reliance Elevator Company, 212 West Austin Avenue, Chicago, has plans for a four-story factory, 67 x 100 ft. Mundie & Jensen, 39 South LaSalle Street, are the architects.

The Electrical Alloy Steel Company, Chicago, has changed its name to the Trojan Electrical Steel Company. The attorney is H. E. Bradley, 133 West Washington Street.

The Atlas Copper & Brass Mfg. Company, Chicago, has been organized with a capital of $5,000 by William H. Bees, H. L. Woodruff, 111 West Monroe Street, and Albert Beerhide.

Mercy Hospital, 2550 Calumet Avenue, Chicago, is about to build a powerhouse in connection with other improvements that will cost $85,000.

The Commonwealth-Edison Company, Chicago, will erect two new power stations which will represent an expenditure of approximately $90,000 for buildings.

J. T. H. Patterson, 140 South Clark Street, Chicago, will build a two-story machine shop, 50 x 82 ft., at 1143 Diversey Boulevard, to cost $12,000.

L. A. Lederer, 2834 Sheffield Avenue, Chicago, is to build a one-story garage, 60 x 132 ft., to cost $11,500.

The Ford Motor Company, Chicago, is building a four-story service station, 75 x 122 ft., at 4301 West Madison Street and a four-story blacksmith shop, foundry and machine shop, 75 x 125 ft., at 4317 Broadway. The cost of each building will be $60,000.

The Independent Can Company, 330 Orleans Street, Chicago, whose new manufacturing buildings are expected to be ready for occupancy Sept. 1, is buying additional machinery.

The Herold Chair Company, 536 Barry Avenue, Chicago, has had plans prepared for a six-story factory, 100 x 200 ft., to replace the one recently destroyed by fire. E. F. Herold is president.

The Western Structural Company, Moline, Ill., has been organized with a capital of $25,000 by Lawrence Roys, L. C. Roys and M. H. Rice.

The New Era Engineering Company, Joliet, Ill., has consolidated with the Elgin Motor Car Company and will locate in Chicago.

The Moline Malleable Iron Company, Moline, Ill., has increased its capital stock from $75,000 to $100,000.

Normal, Ill., has plans for the erection of a municipal electric light plant.

The Decatur Malleable Iron Company, Decatur, Ill., has been incorporated with a capital of $2,500 by M. B. Rutherford, C. E. Yocam and J. R. Peterson.

The Pekin Concrete Products Company, Pekin, Ill., has been incorporated with a capital of $15,000 by J. Leonard Kayler, George P. Kroll and Adam Seal. It will manufacture concrete tile and other concrete products.

The Burgess-Norton Mfg. Company, Geneva, Ill., manufacturer of hardware specialties, is building a second addition to its works, 50 x 120 ft.

The Globe Mfg. Company, Perry, Iowa, advises that its new plant, which will provide about 40,000 sq. ft. of floor space and include a machine and wood-working shop, is expected to be ready for occupancy Oct. 1.

The Fisher Governor Company, Marshalltown, Iowa, has plans for a factory, 58 x 80 ft., estimated to cost about $15,000.

The Tuttle Mfg. Company has acquired the plant of the Hiawatha Mfg. Company, Hiawatha, Kan., and will make a general line of farm implements. It will erect two additional buildings.

Maendler Brothers, St. Paul, Minn., have taken out a permit for a four-story brick and concrete factory to be erected at a cost of $60,000.

Detroit

DETROIT, MICH., June 26, 1916.

The Detroit Seamless Tubes Company, Detroit, has acquired a site of 11 acres at West Fort and Boyd streets on which a new plant of reinforced concrete construction will be erected at a cost of several hundred thousand dollars. It manufactures a complete line of steel tubing, including locomotive flues, boiler tubes and automobile and mechanical tubing.

The Ellis Engine Company, Detroit, manufacturer of gasoline and oil-burning engines, has filed a voluntary petition in bankruptcy and the Detroit Trust Company has been appointed receiver.

The Peninsular Smelting Company, Detroit, has acquired a site for a new plant at Ferdinand and West Jefferson avenues. It has outgrown its present factory and work will be begun on the new plant as soon as possible.

The Alloy Die Casting Company, Detroit, has been incorporated with $25,000 capital stock to manufacture dies, etc. The incorporators are Ralph Johnson, Henry Hensler and Frederick R. Minckler.

The French Society of Chemical Products, Detroit, has been incorporated with $100,000 capital stock to manufacture chemical products. The incorporators are Claude Fraysse, George T. White and H. E. Marshall.

The Saginaw Motor Car Company, Saginaw, Mich., recently organized, has purchased the plant formerly occupied by the Argo Electric Vehicle Company and will begin manufacturing operations shortly.

The Thermophore Mfg. Company, Kalamazoo, Mich., has been incorporated with $60,000 capital stock to manufacture gas heaters. It has acquired a plant and will begin operations at once. The incorporators are Harry den Blyker, E. P. Lewis and Edwin Desenberg.

The Parrott Tractor Company, Jackson, Mich., has been reorganized with $500,000 capital stock under the style of the Parrott Motive Power Company. It is negotiating for a plant to manufacture farm tractors.

The Piqua Handle & Mfg. Company, Piqua, Ohio, manufacturer of implement handles and other wooden products, will establish a branch plant at Marquette, Mich.

The Houghton County Electric Light Company, Houghton, Mich., will greatly increase the capacity of its plant by the installation of new equipment.

The Lansing Fuel & Gas Company, Lansing, Mich., will double the capacity of its plant and equipment at an expenditure of $250,000.

The Alter Motor Car Company, Plymouth, Mich., will remove to Bay City, Mich., where a plant, to cost $20,000, is being erected.

The Auto Body Company, Lansing, Mich., is building an addition to its plant and will increase its capital stock from $500,000 to $1,000,000.

The Lakeside Foundry Company, Muskegon, Mich., will erect a foundry, 75 x 225 ft., to cost approximately $12,000.

The Johnston Brothers Boiler Works, Ferrysburg, Mich., lost its main buildings by fire June 5, with a loss estimated at $150,000. Temporary structures have been erected and production is proceeding on nearly a normal basis. New steel buildings have been contracted for, erection to start July 1. The plant will be enlarged and is to be completed within 90 days.

Indianapolis

INDIANAPOLIS, IND., June 26, 1916.

The Burnall Fuel Saver Sales Company, Wabash, Ind., has been incorporated with $10,000 capital stock to manufacture fuel savers. The directors are Norva P. Lavengood, William A. Zeller and Robert L. Bailey.

Henry D. Cornelius has been appointed receiver of the Potts & Suits Mfg. Company, Indianapolis, manufacturer of oil furnaces.

The Pittsburgh Piping & Equipment Company, Indianapolis, has increased its capital stock from $150,000 to $300,000.

The circuit court has ordered the sale of the Jackson Shovel & Tool Company, Montpelier, Ind.

The Sevison Electric Company, Elkhart, Ind., has increased its capital stock from $10,000 to $100,000.

The Chesterton Iron Works, Chesterton, Ind., has been incorporated with $25,000 capital stock to manufacture tanks. Charles F. Remmert and Charles R. and M. Folsom are the directors.

The Warner Implement Company, Hammond, Ind., has been incorporated with $35,000 capital stock to manufacture farm machinery. The directors are Frank Hammond, Giles Warner and W. F. Bridge.

The Dry Kiln Door Carrier Company, Indianapolis, has been incorporated with $11,100 capital stock to manufacture door carriers. The directors are M. B. Hussey, Orville F. and M. W. Shattuck.

The Wilbur Johnson Company, Indianapolis, has been incorporated with $10,000 capital stock to manufacture motor vehicles and parts. The directors are Wilbur C. Johnson, Arthur R. Baxter and Charles R. Fant.

The New Albany Mfg. Company, New Albany, Ind., which recently consolidated with the Henry H. Martin Mfg. Company, Louisville, Ky., has built an addition to its foundry, doubling the capacity, to take care of its increased business.

The Sefton Mfg. Company, Anderson, Ind., has awarded the contract for a two-story brick factory, 50 x 160 ft., to cost $18,000, to be occupied by the saw department.

O. A. Gordon, Indiana Harbor, Ind., builder of tank cars, is about to build an addition to his shop, 90 x 250 ft., to cost $40,000.

The Indiana Brass Company, Frankfort, Ind., will install a battery of brass-melting furnaces.

The Gilderman Mfg. & Foundry Company, LaPorte, Ind., has taken over the business of the Gilderman Mfg. & Furnace Company, formerly of Syracuse, Ind., and is erecting a foundry, 60 x 200 ft., to be completed by July 15.

Milwaukee

MILWAUKEE, WIS., June 26, 1916.

Conditions in the machine-tool industry are improving to such an extent that tool-builders are now able to give definite assurances on deliveries. Orders are plentiful, mostly for single machines of standard types. Manufacturing operations are still at a high level. Many more men could be used if they were available. Labor conditions are calm; but apprehension is felt over developments expected about July 1 in the hours-of-work controversy. The mobilization of the Wisconsin National Guard has taken a few men from the machines; but the effect locally is negligible, as Milwaukee's quota is under 700 men all told. In other industrial centers of the State metal-working industries have lost considerable numbers of men. At Beloit, Wis., Fairbanks, Morse & Co. gave more than 40 men, or one-third of the local militia company. Common labor is being paid as high as 30c. an hr. in Milwaukee and all steady labor available is fully employed. The demand for lead and zinc miners from southwestern Wisconsin cannot be filled, although wages ranging from $2.75 to $4 a day are offered with free railroad fare. Northern Michigan mines are calling on Milwaukee for help, but continue to be disappointed.

The Aluminum Sign Company, Kewaunee, Wis., has increased its capital stock from $15,000 to $75,000 and will treble the size of its plant and install new equipment. A. B. Leyse is president and Norman Leyse is secretary and treasurer.

The Horlick's Malted Milk Company, Racine, Wis., will erect a private garage and machine shop at its main plant at Racine and has placed the work in charge of G. L. Lehle, architect, 3739 Pine Grove Avenue, Chicago. The building

will be 70 x 155 ft., one and two stories, of reinforced concrete and steel.

Articles of incorporation have been filed in behalf of the Fish Rotary Oven Company, Walworth, Wis. The capital stock is $75,000 and the incorporators are G. W. Curtiss, W. D. Church and B. K. Blakely.

The Resilient Auto Wheel Company, organized recently at Wausau, Wis., has taken a long-term lease on an idle factory building and will install equipment for the manufacture of a spring and ball-bearing wheel for automobiles. About 50 workmen will be employed at the beginning.

The machine shops of the Edward Hines Lumber Company, Chicago, at the big sawmill at Cusson, near Washburn, Wis., were destroyed by fire, together with two standard and three narrow-gage locomotives, machine tools and other equipment.

James Morgan, Rhinelander, Wis., is ready to award contracts for the erection of a garage of reinforced concrete, 60 x 140 ft., two stories and basement, to cost $25,000.

The Four Wheel Drive Automobile Company, Clintonville, Wis., on June 18 shipped 33 additional army trucks, complete with bodies and equipment, to El Paso, Tex., on orders from the War Department, Washington. The other lots went forward in simple chassis form. The company is working on an order for 50 army cars for Russia, and has shipped a sample car to the Japanese Government for experimentation.

The Board of Supervisors, Milwaukee County, is preparing to take bids about July 1 for the erection of the new chair factory for the new house of correction at North Milwaukee, to cost $85,000. The factory will be 62 x 243 ft., two stories and basement, of reinforced concrete. Louis G. Widule is county clerk.

The Bergstrom Paper Company, Neenah, Wis., paper and pulp manufacturer, has increased its capital stock from $100,000 to $250,000 and will increase its output.

The Gurney Refrigerator Company, Fond du Lac, Wis., has awarded the contract for an addition, 60 x 80 ft., four stories and basement, to the F. A. Little Company, and work is now under way. An investment of $25,000 is planned.

The Racine-Sattley Company, Racine, Wis., formerly one of the largest producers of vehicles in the Central West, has disposed of its plant at Springfield, Ill., to Montgomery, Ward & Co., mail order house, Chicago, who will operate it on their own account after July 1. The Racine plant was closed several years ago and leased in parcels to various industries, 22 concerns now occupying the group.

The Federal Engineering Company, 218 Stephenson Building, Milwaukee, is about to take figures on a new garage and repair shop for the Belleview Garage Company, Downer Avenue and Mineral Spring Road, East Milwaukee, of brick, 70 x 160 ft., one story and basement, to cost about $15,000.

The American Brass Foundry Company, 198-202 Milwaukee Street, Milwaukee, will move on July 1 to new quarters at 1916 St. Paul Avenue, formerly occupied by the Universal Machinery Company. It will practically abandon its foundry business and devote its attention exclusively to automobile accessory manufacture. Its capacity will be more than doubled by the removal. The present shop on Milwaukee Street will be enlarged at once and will be occupied by the Allis Fire Extinguisher Company, 434 Jefferson Street, Milwaukee.

The Continental Motor Truck Company, Superior, Wis., has awarded the general contract for its new automobile truck works on Belknap Street to Emil Sedlacheck. It will be of reinforced concrete, brick and steel, 80 x 200 ft. J. G. Barnsdale is secretary and chief engineer.

The Everburn Heater Company, Milwaukee, has been organized by C. H. Krebs, A. J. Mayer and Lawrence A. Olwell, attorney, to manufacture heaters for refrigerator and freight cars. The capital stock is $20,000. Mr. Krebs, the designer of the appliance, has been contracting for its manufacture for some time, but now intends to establish his own plant.

Cincinnati

CINCINNATI, OHIO, June 26, 1916.

The demand for machine tools shows some improvement. While the big buying for export is understood to be about over orders are coming in for machines to be shipped to Russia, England and France. The Canadian business also is good. It is reported that manufacturers in Dayton, Ohio, have lately been seeking certain sizes of lathes in order to be in position to bid on finishing a large lot of high-explosive shells for the Allies. The contract for the forgings, it is said, has been let to a firm in that city. Quite a nice order for portable electric drilling machines was received last week for shipment to Italy.

The Government's call for the National Guard will affect the labor situation in only a small degree, as many skilled mechanics who had left the city when the recent strike was called are now returning. Without exception, manufacturers interviewed state that they will hold positions open for all employees who are called to the colors.

A survey of the situation shows that manufacturing building operations are not at a standstill by any means, in spite of the high cost of building materials. The American Tool Works Company's new plant on Pearl Street is one of the large contracts under way, and the foundations are expected to be completed within a short time. Work is proceeding rapidly on the plant of the R. K. LeBlond Machine Tool Company and on the large foundry addition for the Lunkenheimer Company. Smaller additions to several other plants are in process of construction.

The Cincinnati Screw Company, manufacturer of screw machine products, Twightwee, Ohio, has increased its capital stock from $100,000 to $200,000. It has placed orders for a large quantity of machine tools, including Brown & Sharpe, Gridley, Cleveland and Hayden automatic screw machines, Acme flat turret lathes, multiple and semi-automatic drill presses, nut tappers, engine lathes, etc. B. B. Quillen is president.

The Dixie Terminal Company, Cincinnati, has been incorporated by Charles P. Taft and others and will build a terminal station at Fourth and Walnut streets. Building plans have not yet been made up.

The Cincinnati Coffin Company, Cincinnati, will make an addition to its plant, 50 x 100 ft., one story, of brick construction. A 10-ton traveling crane is included in the equipment to be installed.

The Cincinnati Export Company, Cincinnati, has been incorporated by L. D. Meader, F. de Soler, and others, with $10,000 capital stock. The company has heretofore operated under a partnership arrangement.

The Hoover, Owens, Rentschler Company, Hamilton, Ohio, will make an addition to its plant, 70 x 400 ft., one story, of brick construction, to be used as a foundry.

The Western Tool Mfg. Company, Springfield, Ohio, contemplates making an addition to its foundry at an early date.

The Dayton Research Laboratory Company, Dayton, Ohio, has been incorporated with $200,000 capital stock by Charles F. Kettering, E. A. Deeds, H. E. Talbot, and others.

Work has been commenced on the new municipal waterworks plant at Ironton, Ohio, estimated to cost $400,000. Nearly all necessary equipment has been purchased.

W. H. Fetters, Plymouth, Ohio, will move his machine shop to Bellevue, Ohio. Additional equipment will be installed in the new shop.

The Jones Clay Products Company, Oak Hill, Ohio, will fit up a brick-manufacturing plant at East Fultonham, Ohio.

The Tubeless Tire & Rubber Company, Millersburg, Ohio, is fitting up a large plant for the manufacture of automobile tires.

Cleveland

CLEVELAND, OHIO, June 26, 1916.

A further evidence of the easing up in the machine-tool business is the fact that dealers are getting better shipments on stock orders, particularly for lathes. These machines, however, stay on the floors only a very short time. New demand is rather light and confined almost wholly to single tools. The New York Central Railroad placed orders the past week for equipment for its Coalburg, Ohio, shops for which it sent out an inquiry several weeks ago for about a dozen machines. The demand for wood-working machinery has improved and is quite active. The call for cranes for shop purposes continues heavy and some makers are six months behind on delivery.

The Reliable Machine Company, Cleveland, maker of automobile parts, will erect a two-story addition, about doubling the present capacity. In addition to its regular line it will make automobile axles complete and expects to purchase about $15,000 worth of machine tools. The capital stock has been increased from $15,000 to $50,000.

The American Stove Company, Cleveland, will enlarge one of its plants by the erection of extensions to three buildings, providing about 50,000 additional square feet of floor space.

The National Bronze & Aluminum Foundry Company, Cleveland, is enlarging its foundry by an extension providing 8000 sq. ft. of additional floor space and rebuilding a part of its plant recently damaged by fire. The equipment has been provided for.

The Willard Storage Battery Company, Cleveland, will erect a one-story brick addition, 302 x 350 ft.

The Ohio Seamless Tube Company, Shelby, Ohio, will

shortly place contracts for enlarging its plant, the building to be 100 x 820 ft.

The Scanlan Machine Company, Toledo, Ohio, has been incorporated with a capital stock of $10,000 by William Wilmington, Julian H. Tyler, E. A. Koster, and others.

The Hinderer Brothers Company, Canton, Ohio, has been incorporated with a capital stock of $20,000 to do foundry and machine work and operate a pattern shop. It was recently announced that the business of Hinderer Brothers in Wooster and Canton would be consolidated in a new plant in Canton.

The Urschel Drop Forge Company, Bowling Green, Ohio, has been incorporated with a capital stock of $100,000 by B. H. Urschel, S. A. Canary, Alfred M. Place, R. M. Harring and B. W. Urschel

Baltimore

BALTIMORE, MD., June 26, 1916.

The Universal Tool Company has been incorporated with $1,000 capital stock to manufacture tools. Harry B. Stengel, Colgate, Md.; T. Bayard Williams, attorney, 1163 Calvert Building, Baltimore, and Sayde Herman Roseberry are the incorporators.

The South Baltimore Car & Foundry Company, Curtis Bay, Md., will build a three-story office building, 51 x 125 ft.

Fire did considerable damage to machinery at the plant of the Jones Hollow Ware Company, Aisquith and Ensor streets, Baltimore.

The Hollingsworth Wheel Company, Hagerstown, Md., is seeking prices on rebuilt planing machines for rim strips.

A garage, including a machine shop, will be erected by B. J. Marshall, Fredericksburg, Va.

Additional machinery will be installed in the municipal hydroelectric plant at Front Royal, Va.

The machine and repair shops of the Wilmington Automobile Company Wilmington, Del., are being enlarged and additional equipment will be installed.

Birmingham

BIRMINGHAM, ALA., June 26, 1916.

Quicker delivery on machine tools is now obtainable, but some large specifications are held up pending expectation of price adjustments. The general machinery trade is good. Pumps and gasoline engines have been in especially good demand.

The Tupelo Compress & Storage Company, Tupelo, Miss., will build a cotton compress. R. L. Taylor is general manager.

Decatur, Ala., has voted $50,000 of bonds for an electric lighting plant.

H. F. Sly, Aliceville, Ala., will build a sawmill with a capacity of 10,000 ft. per day.

It is reported that the Southern Power Company, Elberton, Ga., has purchased for $200,000 water-power rights on the Savannah River, which it plans to develop.

The Georgia-Carolina Packing Company, Augusta, Ga., has been incorporated by J. P. Wood, Robert C. Berkmann, and others, with a capital stock of $1,000 and privilege to increase to $1,000,000, and proposes to build a meat-packing plant.

The Wiedeman-Fisher Company, Tampa, Fla., has been incorporated with $100,000 to manufacture boxes.

It is understood that the Charleston Cement Products Company, Charleston, S. C., will double its capacity.

The Orangeburg Packing Company, Orangeburg, S. C., with a capital stock of $200,000, intends to build a meat-packing plant. Robert Lide and others are interested.

The Central South

LOUISVILLE, KY., June 26, 1916.

Business continues good. It is noted by boiler manufacturers that inquiries for return tubular boilers are more numerous than inquiries for water-tube boilers. Most of the work, however, is for general boiler shop and plate work. Machinery requirements seem insatiable and demands and inquiries continue apace. Repair orders and special jobs are numerous.

The Ohio Valley Mfg. & Sales Company, with $30,000 capital, has been incorporated in Louisville to make automobiles. H. W. Rahm, Leo Rahm and W. B. Buzziard are the incorporators.

James McWilliams & Co., Louisville, manufacturers of heating plants, have been incorporated with $12,000 capital by James and F. L. McWilliams and Kelly F. Miles.

The Hougland Brothers Company, Louisville, has incorporated with $1,200 capital to manufacture automobile tires and other accessories. Oscar and Roscoe Hougland and Charles Vonderhite are the incorporators.

Hagan & Walters, Winchester, Ky., announce that they will discontinue automobile repair work and hereafter devote their attention to farm machinery repairs.

The St. Louis Light & Development Company has purchased from Alex Walker the Lancaster Electric Light Company, Lancaster, Ky. Roy Schooler will be manager.

The Lexington Signal Company, Lexington, Ky., has been incorporated with $20,000 capital to make signals and electric devices. The incorporators are A. E. Gaugh, Jerry Cawby, E. A. Baxter and John Gund.

Bloomington, Ky., has voted $62,000 in bonds for a waterworks system. The mayor may be addressed.

The Rowan County Freestone Company, Farmers, Ky., is in the market for a carload of soft steel stone saw blades, 1/8 to 5/32 in. thick, 3½ to 4½ in. wide, in lengths 11 ft. 8 in., 13 ft. 8 in. and 17 ft. 8 in.

Henderson, Ky., will install two additional units at the new waterworks at a cost of $4,756. Mayor Johnson may be addressed.

The Newton Light & Power Company, Newton, Tenn., has been incorporated with $2,000 capital by W. A. Prince, J. E. Cook, J. D. and R. W. Clemmer and Harry Swan, Jr.

The wood-working plant of the Harlan-Morris Company is to be moved from Corinth, Miss., to Jackson, Tenn.

The Chattanooga Brass & Machine Company, Chattanooga, Tenn., has been incorporated with $15,000 capital by W. L. Cace, Carl Flatter, John W. Fort and W. F. Norman.

St. Louis

ST. LOUIS, MO., June 26, 1916.

A steady run of machine-tool business has kept dealers busy continuously. Tools are more available than they have been, and replacement orders, extensions of plants and the installation of new plants are being more frequently reported. The call for single tools keeps up. Collections remain very good and money is easily obtainable, both for commercial purposes and for new industries. Second-hand tools are still very scarce.

The Commercial Auto Body Company, St. Louis, Mo., has been incorporated with a capital stock of $50,000 by Hugh F. Cartwright, and others, and will extend an existing plant, adding new equipment, largely wood-working.

The Gus Gillerman Iron & Metal Company, St. Louis, Mo., has been incorporated with a capital stock of $10,000 by Gus Gillerman and others to engage in iron and metal recovery.

The Merchants Truck Company, St. Louis, Mo., has been incorporated with a capital stock of $15,000 by John A. Young, Theodore Mueller and H. F. Steele and will equip a garage and repair shop for handling motor-truck repairs, etc.

The Medart Patent Pulley Company, St. Louis, Mo., will build an addition to its factory.

The St. Louis Independent Packing Company, St. Louis, Mo., has contracted for the erection of a cold-storage building, four stories, 165 x 177 ft.

Brookfield, Mo., will equip an electric light and power plant at a cost of about $60,000 under the direction of E. E. Harper, Kansas City, Mo., engineer.

The plant of the Colson Novelty Company, manufacturer of advertising novelties, Paris, Ill., which has been destroyed by fire with a loss of $100,000, will be rebuilt.

C. A. Hoppin & Co., Peoria, Ill., have been incorporated with a capital stock of $10,000 to manufacture electrical equipment.

The Decatur Malleable Iron Company, Decatur, Ill., has been incorporated with a capital stock of $100,000 by A. W. Wagner, E. V. Wierman and John M. Byrne to do a general foundry and machine shop business.

The Golconda Portland Cement Company, Golconda, Ill., has been incorporated with a capital stock of $1,500,000 by H. G. Calkins, Edward B. Clark and Charles Durfee to manufacture cement, etc.

The Terry Dairy Company, Little Rock, Ark., Eighteenth and Scott streets, will equip a 10-ton ice plant at a cost of $7,000.

The Alex Kilpatrick & Sons Foundry Company, St. Louis, Mo., has acquired a large tract of land in the northern part of the city and will equip an extensive plant which will be operated as another unit of the present plant of the company.

A. M. Frazier, Rush, Ark., representing the Pekin Stave Company, will equip a stave mill to work up white-oak timber land recently acquired.

The Deep Red Valley Threshing Machine Company, Devol, Okla., has been incorporated with a capital stock of $13,000 by A. L. Phillips, G. A. Smith and G. P. Hamilton and will manufacture threshing machines.

S. Dougherty, Beaumont, Tex., will equip a brass foundry and machine shop at Tulsa, Okla.

H. C. Stahl and M. A. Younkman, Tulsa, Okla., will erect a garage to cost about $15,000 and will install machine-shop equipment.

The Missouri, Oklahoma & Gulf Railroad, Henryetta, Okla., will equip shops at a cost of about $80,000. J. W. Dawson, Muskogee, Okla., is chief engineer.

The St. Louis & San Francisco Railroad will expend about $200,000 in improving its shops, roundhouse and general mechanical equipment at Tulsa, Okla. V. K. Hendricks, chief engineer, St. Louis, Mo., is in charge.

Baldwyn, Miss., will receive bids until July 12 for water-works pumping station and electric light plant equipment, including oil engines, generators, pumps, etc.

The Algiers Distilling Company, Algiers, La., is reported in the market for a feed-water heater of 900 hp., and other equipment.

West Monroe, La., has voted to expend $45,000 for the installation of an electric pump, filtering plant, electric light and power machinery.

The Great Southern Lumber Company, Bogalusa, La., will equip an addition to its plant at a cost of $800,000 for manufacturing paper from pine waste. W. H. Sullivan is general manager and is reported in the market for $600,000 worth of machinery.

The Automatic Castnet Company, Lockport, La., has been incorporated with a capital stock of $25,000 to manufacture a cast net fishing device.

Texas

AUSTIN, TEX., June 24, 1916.

Notwithstanding disturbed conditions along the Rio Grande border, industrial affairs are more active than usual. The demand for various machines and smaller tools shows a growing increase. The prospective large cotton crop insures the building of many new cotton gins and cotton-seed oil mills.

The Texas Sugar Company, which has a capital stock of $100,000, will build and operate a sugar mill near Brownsville. F. W. Kibbe is interested.

The San Antonio Utilities Mfg. Company, San Antonio, will establish a plant for manufacturing machinery. H. L. Rice is a stockholder.

Alston Boyd, Memphis, Tenn., W. S. Mountaine, San Antonio, and others, have purchased a site at Dallas for a new cotton-seed oil mill which they will build at a cost of about $150,000. It will contain six presses and have a daily capacity of 100 tons.

H. H. Howard and associates, who are building a plant at Henrietta for manufacturing glass, have organized the Howard Glass Mfg. Company, with a capital stock of $40,000.

The Fort Worth Battery Company, Fort Worth, is preparing to manufacture electric batteries. R. E. Cole is a stockholder.

The Farmers' Gin Company, Kennard, will build a cotton gin to cost about $5,000.

The Smith Gin Company, San Marcos, will build a cotton gin to cost about $8,000.

The Sherman Oil Mill, Sherman, has increased its capital stock from $100,000 to $150,000, and will enlarge and improve its cotton-seed oil mill.

Shiner, Tex., will issue $12,000 in bonds for constructing an electric light plant.

An additional supply of water for the Salt River irrigation project near Phoenix, Ariz., will be developed by an auxiliary storage dam upon the Verde River and the installation of pumping plants.

The Cotton-seed Oil Company, Dallas, will build a cotton-seed oil mill to cost about $135,000. W. C. Barnes is a stockholder.

The Union Gin Company, Rockwall, will build a cotton gin to cost about $15,000.

The Chico Crushed Stone Company, Chico, will install crushing machinery.

The El Paso Contotite & Tetta Company, El Paso, will build a plant to manufacture terra cotta, ornamental plaster, roofing tile, etc. W. G. Jolly is president.

The Pacific Northwest

SEATTLE, June 20, 1916.

Orders and inquiries that have been reaching lumber mills the past few days forecast a new buying movement which, it is believed, will be an excellent thing in steadying a market which has shown signs of instability. It is not believed that there will be further price concessions. Eighty-three mills report a balance of orders on hand for rail and local delivery amounting to 5380 carloads or about 134,500,000 ft. Thirteen mills report export orders of 23,998,136 ft. Owing to water-front labor troubles and general shipping difficulties, the cargo trade has been greatly restricted, only eight mills booking this line of business within the past week.

Recent figures show that Seattle's manufacturing enterprises have increased their production more than 100 per cent in the last ten years. In 1914 wages paid out amounted to $9,935,000, and $37,770,000 was expended for materials.

W. E. Schimpff and C. H. Callender of Astoria, Ore., plan the construction of a central heating plant in that city to cost $50,000.

A fire recently damaged the plant of the Capital City Iron Works, Olympia, Wash., to the extent of $1,000.

The plant and properties of the Similkameen Power Company, near Oroville, Wash., have been purchased by Walter C. Sivyer and Eugene Enloe of Wenatchee, Wash. The new owners announce that more than $250,000 will be expended in improvements and extensions to the plant. A dam 45 ft. high is to be erected and 4000 hp. will be developed.

The Pacific Foundry & Machinery Company, Seattle, has been incorporated for $500,000 by J. L. McDonald, H. S. Hendrickson and Frank A. Paul.

The port of Astoria, Ore., has voted to construct an electric coal-handling device on pier No. 2 to cost approximately $38,000.

The C. B. L. Auto Repair & Electrical Company, 924 Tacoma Avenue, Tacoma, has been incorporated by W. J. Connor, L. W. Barr and R. M. Laffaw. It will establish a machine shop and repair plant and will install a lathe, a drill press, etc.

Wilson Brothers, who have timber holdings on the Mipkish River, near Vancouver, B. C., plan the construction of a saw-mill plant near Vancouver which will cost several million dollars. A power plant is included in the proposed development.

The Seaborn Shipyards Company, Tacoma, Wash., has recently placed an order with the St. Paul & Tacoma Lumber Company for 1,500,000 ft. of ship timbers to be used in connection with its new shipbuilding plant.

The Calvin-Johnson Company, 232 West Sprague Avenue, Spokane, has been incorporated for $20,000 by Francis G. Cavers, M. A. Draper and A. H. Anderson of Spokane and J. E. Johnson, Wilbur, Wash., to manufacture carburetting devices for automobiles.

The Sanitary Pulp Products Company, Spokane, Wash., has been incorporated for $800,000 and will establish a plant to manufacture milk bottles and other containers from paper pulp. R. Keller and the Keller-Lorenx Company, Spokane, is president.

It is definitely announced that the sawmill of the Roo & Van Leeuwen Company, Bellingham, Wash., recently destroyed by fire, will be rebuilt.

The Home Building Company, Vancouver, Wash., recently incorporated, plans the construction of the first unit of a wood-working and manufacturing plant.

George Pape, East 4307 Riverside Drive, Spokane, Wash., plans the construction of a barrel factory. Work will begin immediately and machinery will be ordered shortly. The plant is to be in operation in about two months.

J. T. McCaughey, assistant general freight agent of the Great Northern Railway, Helena, Mont., is interested in an Eastern syndicate which plans the establishment of several paper mills in Montana, the first to be located in Big Fork, Flathead County.

The Ornamental Iron Works, Spokane, Wash., has increased its capital stock from $15,000 to $25,000 to provide a larger working capital. H. E. Simons is president.

Canada

TORONTO, June 26, 1916.

The commission appointed to make all purchases under the Dominion war appropriation of $100,000,000 includes George G. Galt, Winnipeg; Hormidas Laporte, Montreal, and A. E. Kemp, Toronto. Thomas Hilliard is secretary of the commission, whose headquarters are at Ottawa.

The $75,000,000 credit extended to the Imperial Munitions Board a few months ago by the Canadian banks is all but exhausted. It is expected that in July a new credit will be

arranged, probably on the same terms as the last. Of the $75,000,000 at least 70 per cent has come back to the banks, the remainder being spent outside the country.

T. L. Church, chairman of the Board of Control, Toronto, is in the market for a 20-in., square base, self feeding, vertical drill, with ¾-in. drill chuck and shafting.

There is at present an opportunity for the sale in districts of southern France of small motor-driven agricultural machines that could be used in vineyards or on small farms. Such machines are of particular interest to vineyard owners. As the vines are placed about 4 ft. apart, the machines would have to be made accordingly. Several experiments under the direction of the French Government are now being made with such machines. An opportune time for their introduction would be at the commercial fair to be held in Bordeaux next September, when an international exhibition will be held.

The Wayagamack Pulp & Paper Company proposes to build a sulphite mill to be operated in conjunction with its plant at Three Rivers, Que. The new plant will cost over $1,000,000.

The Ontario Steel Products, Ltd., which is a consolidation of four steel manufacturing companies, and operates plants at Gananoque and Chatham, Ont., is now making considerable additions to its plants. The company has just received a large Government order for trench tools. It has for some time been working at full capacity on its regular spring, axle and shovel business, and has recently closed contracts with the Ford, Chevrolet, Briscoe and other motor companies for springs, etc., which will keep its plants working at full capacity for nearly two years. The additions to its plants at Chatham and Gananoque are being rushed in order to make prompt deliveries. Of the business done by the company in the past year 90 per cent has been in its regular lines, with only 10 per cent which might be called war business.

The Canadian Regal Motor Company, manufacturer of automobiles, has commenced the erection of a plant at Berlin, Ont.

The Welland Motor & Machine Company, Welland, Ont., will build a factory at a cost of $3,500.

A large brick amalgamation has just been completed by which the Milton Pressed Brick Company, Ltd., Milton, Ont., takes over the Toronto Pressed Brick Company of Milton and the Medina Shale Brick Company of Streetsville, Ont. The new company will have a capital stock of $1,500,000. J. S. McCannell is president and managing director.

The Peter Lyall & Sons Construction Company, Montreal, has an arrangement with the Dominion Government for the production of shells for at least three years.

Kingsville, Ont., will spend $16,000 for improvements to its waterworks pumping plant. George Pearse is clerk.

J. L. Foster, Saskatoon, Sask., is interested in a company which proposes to establish a large shipbuilding plant at Esquimalt, B. C.

C. F. Smalley of the Smalley Mfg. Company, Manitowoc, Wis., is considering establishing a branch plant at Exeter, Ont., in connection with the Connor Machine Company.

The Canadian Tube & Iron Company has commenced the erection of a building at Montreal to cost $3,000.

The Oliver Chilled Plow Works, Ltd., Hamilton, Ont., will build an addition to its plant on Burlington Street at a cost of $2,000.

The M. Brennen & Sons Mfg. Company, Hamilton, Ont., is in the market for a power feed ripsaw, a four-sided sticker, a stationary steam engine of 35 to 50 hp., and a 10 to 50-hp. motor.

T. Welsh, Sunderland, Ont., is in the market for two 15-hp., three-phase, 220-volt, 60-cycle squirrel-cage motors.

The Hull Iron & Steel Foundries, Hull, Que., is building an addition to its plant, 90 x 150 ft., at a cost of $30,000. It will be used as a small castings department.

The Standard Chemical Iron & Lumber Company, Fassett, Que., is building a new plant to replace one recently destroyed by fire with a loss of $75,000.

The Renfrew Electric Mfg. Company, Renfrew, Ont., has commenced the erection of an addition to its factory to cost $5,000.

The Tonopah-Belmont Development Company, Vancouver, B. C., is building a dam at Surf Inlet mine on Princess Royal Island, B. C., to develop 1500 hp. It is proposed to construct an electric railway to connect the mine with the head of navigation, so that the machinery can be placed on the site.

The Board of Control, Montreal, is stated to have plans in preparation for a powerhouse, which, it is estimated, will cost $1,500,000 equipped. Bids will be called next winter.

The Hampel Box Company, Bridge Street, Brantford, Ont., will build a brick factory at a cost of $12,000.

The Dodge Mfg. Company, 138 Bay Street, Toronto, will build a one-story garage and an addition to its machine shop at Pelham and Osler avenues, to cost $1,800.

John T. Wilson, Ltd., Toronto, has had its charter extended to include the manufacture of iron, brass, machinery, tools, etc.

The Rochester Lamp Company, Ltd., Toronto, has been incorporated with a capital stock of $40,000 by Clayton J. Spencer, manager, 695 Ontario Street; Robert R. Hempseed, 36 Seymour Avenue; Alan G. Manley, and others, to manufacture lighting, heating, electrical and gas fixtures, etc.

The Carbo Corporation of Chicago, manufacturer of steel posts and fence supports, will begin the erection of a plant on King Street East, Berlin, Ont., in a few weeks.

The Monteith Pulp & Timber Company, Ltd., 123 Bay Street, Toronto, is in the market for a split iron pulley or balance wheel, 9 or 10 ft. in diameter, about 7¼-in. bore, to weigh about 4000 lb.

R. E. Ankenmann, Chesley, Ont., is in the market for a lathe suitable for a garage.

The refinery at the Nipissing Mines, Cobalt, Ont., was destroyed by fire June 21. The loss will be very extensive, and refining operations will be suspended for some time. This was the largest silver refinery in Canada.

The Canadian Products Company, New Westminster, B. C., recently incorporated to take over the plant of the Duchesnay Packing Company at Ladner, is preparing to build a packing plant and evaporator at New Westminster, to cost $30,000.

The Woodsplitter, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Alfred E. Cooper, 118 Emmerson Avenue; Clark Allen, 37 Highview Crescent; Richard McCullock, and others, to manufacture machinery to split wood, etc.

The Dental Company of Canada, Ltd., Toronto, has been incorporated with a capital stock of $100,000 by Alexander Fasken, Excelsior Life Building; George H. Sedgewick, 17 Poplar Plains Road, James Atchison, and others, to manufacture dental instruments, etc.

Government Purchases

WASHINGTON, D. C., June 26, 1916.

Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, June 20, for supplies for the naval service, as follows:

Schedule 9654, Steam Engineering

Class 1, Puget Sound—One traveling crane—Bid 183, $15,100; 287, $15,680, alt., $14,600.

Alternate—Same, f.o.b.—Bid 67, $14,200; 183, $13,465.

Schedule 9672, Steam Engineering

Class 2, Mare Island—Six Diesel-type engines with six sets spare parts—Bid 169, $245,947.65.

Alternate A—Same, f.o.b. works—Bid 55, $149,460.50; 169, $242,247.57 and $249,747.65; 184, $132,000.

Alternate B—Four engines with four sets spare parts—Bid 169, $171,495.

Schedule 9718, Steam Engineering

Class 152, Withdrawn.

Class 153, Charleston—Two sets steam turbine-driven blowers—Cancelled.

Schedule 9749, Steam Engineering

Class 412, Brooklyn—One oil-burning crucible furnace—Bid 175, $415; 176, $325.

Schedule 9750, Steam Engineering

Class 414, Philadelphia—Three pipe-threading and cutting-off machines—Bid 85, $2,006; 89, $2,945.30; 136, $2,551.30; 151, $3,840.32; 171, $3,455; 183, $3,689; 188, $4,845; 224, $2,810.50 and $2,986.30.

The names of the bidders and the numbers under which they are designated in the above list, are as follows:

Bid 55, James Craig Engine & Machine Works; 67, The Cleveland Crane & Engineering Company; 79, Diehl Mfg. Company; 85, The Fairbanks Company; 89, E. D. Fraser; 108, General Electric Company; 127, Ilg Electric Ventilating Company; 136, Kemp Machinery Company; 151, Landis Machine Company; 169, McIntosh & Seymour Corporation; 171, Manning, Maxwell & Moore; 175, Mircs Fuel Oil Equipment Company; 176, The Monarch Engineering & Mfg. Company; 183, Niles-Bement-Pond Company; 184, New London Ship & Engine Company; 188, D. Nash Machinery Company; 224, Sherritt & Stoer Company, Inc.; 241, B. F. Sturtevant & Co.; 287, S. B. Harding.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

ENFORCEMENT OF SELLER'S WARRANTY.—An engine valve was sold under a form guarantee that it would increase the power of the buyer's engine, but the contract also specified that in case the valve should fail to work satisfactorily, written notice should be given the selling manufacturer, with opportunity to remedy any defective condition by repair or substitution of a new valve, and that if a substituted valve should not work properly the buyer's payment or notes should be returned on return of the valve. Held, that the buyer was not entitled to rely upon a claimed breach of warranty as a counterclaim in suit by the seller to recover the agreed price of the valve, without showing that he had conformed to the above mentioned conditions of the warranty. (Oklahoma Supreme Court, Gould Balance Valve Company vs. Updegrove, 156 Pacific Reporter, 684.)

AUTHORITY OF TRAVELING SALESMEN.—A traveling salesman has no implied authority to bind his employer by agreeing to extend the time for payment of debt due from a customer. Such an agreement is binding only when expressly authorized. (Kentucky Court of Appeals, Rice & Hutchins Cincinnati Company vs. J. W. Croghan & Co., 184 Southwestern Reporter, 374.)

DUTY TO SAFEGUARD FURNACE PLATFORMS.—The Pennsylvania law which requires employers to safeguard machinery against injuries to employees does not require construction of a guard rail on a platform on which men are required to work near a furnace. Such an employee assumes the risk of falling from the platform, he knowing the surrounding conditions. (Pennsylvania Supreme Court, McCosh vs. Jones & Laughlin Steel Company, 96 Atlantic Reporter, 1091.)

CONSIGNEE'S LIABILITY UNDER INTERSTATE COMMERCE ACT.—A consignee of freight may be subjected to penalty under the federal laws for misrepresenting the weight of an interstate shipment for the purpose of obtaining transportation at less than regular rates, although the false statement was made after delivery of the freight, but before adjustment of the charges. (United States Supreme Court, United States of America vs. Union Mfg. Company, 36 Supreme Court Reporter, 420.)

TIME FOR DELIVERY OF GOODS SOLD.—If a contract for sale of goods fails to specify the time within which delivery is to be made, the seller is entitled to reasonable time in which to deliver. (New York Supreme Court, Weinberg vs. Gash, 158 New York Supplement, 179.) A contract buyer could not defeat recovery of damages for refusing to accept delivery of a specially manufactured engine tendered in May, although the contract was made the preceding November, it appearing that the seller wrote the buyer April 16, stating that the engine was ready for shipment and asking shipping instructions, and that the seller again wrote April 27 that shipment would be made May 4, in the absence of instructions to the contrary, which were not given by the buyer. (Massachusetts Supreme Judicial Court, Homer vs. Baker Yacht Basin, 112 Northeastern Reporter, 151.)

AGGRAVATION OF INJURY BY WORKMAN'S OWN IMPRUDENCE.—An employee of a steel company is not entitled to an award under the Wisconsin compensation act as for permanent disability resulting from an injury sustained in the course of his employment when it appears that the disability would have been temporary only except for his refusal to submit to a minor operation, simple, safe and certain. (Wisconsin Supreme Court, Lesh vs. Illinois Steel Company, 157 Northwestern Reporter, 539.)

VALIDITY OF NON-RESIDENT CORPORATION'S CONTRACT.—A corporation of another State which has not complied with the laws of Michigan relating to the transaction of business in that State by non-resident corporations is not entitled to enforce a contract for sale of machinery which is not only to be manufactured and shipped in another State, but is to be installed by the company in Michigan, unless it appears that, by reason of some special character of the machinery, the agreement for installation was an essential part of the contract of sale. (Michigan Supreme Court, Power Specialty Company vs. Michigan Power Company, 157 Northwestern Reporter, 408.)

INJURY IN OPERATING AIR HOISTS.—A foundry company may be held liable for injury to a finisher and molder, resulting from a heavy beam being thrown from a hook on an air hoist operated by other employees in shaking a casting from a flash, when it appears that there was negligence toward the injured employee in the method in which the work was carried on, considering the proximity of his place of work, and in failing to use a safety block on the hoist. (Missouri Supreme Court, Trebbe vs. American Steel Foundries, 185 Southwestern Reporter, 179.)

TIME AND PLACE FOR DELIVERY.—When a contract to sell goods to be manufactured by the seller contains no agreement as to where delivery is to be made, it will be presumed that the buyer intended to accept delivery at the seller's factory. Statement in an offer to construct a machine that the manufacturer expects to be able to complete it within three weeks after receipt of the order does not make that time an essential part of the contract, the buyer not mentioning time for delivery in his acceptance of the offer. (New York Supreme Court, Appellete Term, Dressler-Beard Mfg. Company, 158 New York Supplement, 875.)

"REASONABLE TIME" FOR DELIVERY BY MANUFACTURER.—When a contract by a manufacturer for sale of goods does not specify the time or times for delivery, he is entitled to a reasonable time in which to deliver. What constitutes a reasonable time is to be determined by the peculiar facts of each separate case. But where the manufacturer has not agreed to place his factory exclusively at the buyer's command, in determining what constitutes a reasonable time consideration must be made for other orders previously accepted by the manufacturer from other customers, as well as the capacity of his factory. (New York Supreme Court, Appellate Division, Velleman vs. Sidney Blumenthal & Co., 158 New York Supplement, 393.)

DUTY TO SAFEGUARD PUNCHING PRESS.—In affirming a judgment against a manufacturer for injury to an operator of a punching press, it is held by the Pennsylvania Supreme Court that the jury was warranted in finding that the employer was negligent in failing to guard a cogwheel at the rear of the machine, the injured man having been caught by it when he slipped while attempting to pick up some iron bars which had fallen to the floor, particularly since the accident occurred in a passageway designed for the convenience of employees. But, of course, there is no duty on the part of an employer to install a guard which will interfere with the proper operation of a machine, and the burden is on a suing employee to show that a safeguard would have been practicable in the particular instance. (Gross vs. Eagle Wheel Company, 97 Atlantic Reporter, 457.)

IRON WORKER'S EXEMPTIONS AS DEBTOR.—The New York statute which exempts from execution a debtor's earnings from personal services rendered by him within 60 days preceding supplementary proceedings under a judgment, when necessary for the support of his family, does not cover the proceeds of an iron-working business carried on by a debtor, unless his personal services, and not those of his employees, are the chief factors of the earnings. But the returns from a business in which one is engaged, when the investment of capital and the employment of labor are but mere incidents to the conduct of the business, and in which the element of personal services predominates, may be considered personal earnings. (New York City Court, Schafer vs. Tyroler, 158 New York Supplement, 1090.)

FINE PRINT CLAUSES AS PARTS OF CONTRACTS.—When an order or contract for sale of goods is apparently complete in itself as to the terms agreed upon, the seller will not be entitled to rely upon conditions contained in fine print clauses appearing at the top of his invoices, letterheads, etc., in the absence of proof that they were drawn to the attention of the buyer or were mutually intended to be incorporated into the contract. (New York City Court, Cohen vs. Walworth, 158 New York Supplement, 1081.)

NEW TRADE PUBLICATIONS

Coal and Ash Gates.—C. W. Hunt Company, Inc., West New Brighton, N. Y. Catalog No. 15-3. Describes gates or valves for controlling the flow of bulk material. In connection with the engravings dimensions are given of the valves used most frequently in power house and storage pocket design. A number of engravings showing the application of the valves are presented and point out the type best suited for any particular duty.

Welding and Cutting Apparatus.—Alexander Milburn Company, Baltimore, Md. Folder. Describes and illustrates a line of oxy-acetylene welding and cutting apparatus, which includes torches, pressure regulators, portable plants and stationary generators. Lists of apparatus supplied for portable welding and cutting outfits are included.

Hoisting Engines.—Dake Engine Company, Grand Haven, Mich. Catalog No. 26. Illustrations and descriptive matter explain the construction and operation of a line of hoisting engines using steam or compressed air. Mention is also made of a number of different types of chain and wire rope hoists and trolleys and electric hoists.

Enamels and Japans.—Moller & Schumann Company, Marcy and Flushing avenues, Brooklyn, N. Y. Bulletin No. 1. Mentions a line of black enamels and japans of the air drying and baking types. A list of the various enamels and japans is given with a statement of the uses to which they can be put and the amount of time required to set or bake them.

Pulverized Locomotive Fuel.—Locomotive Pulverized Fuel Company, 30 Church Street, New York City. Bulletin No. 1. Points out the advantages of using pulverized fuel such as anthracite, bituminous or semi-bituminous coal, lignite or peat for fuel in locomotives. Among the advantages claimed for this type of fuel are freedom from smoke, increased boiler efficiency, the elimination of sparks, firing tools, clogged flues, etc., even distribution of heat in the firebox and the securing of a higher average temperature of superheated steam. A comparison of a locomotive equipped with apparatus for burning pulverized fuel which was exhibited at Atlantic City at the railroad conventions, with other engines of approximately the same size, is included.

Galvanometer Lamp and Scale.—Leeds & Northrup Company, 4901 Stenton Avenue, Philadelphia, Pa. Bulletin No. 219A. Gives general description and specifications for a lamp and scale for use with galvanometers. The features upon which special emphasis is laid are ease of reading and compactness. A diagram showing the way in which the lamp and scale are used is included and directions for setting it up are given.

Internal Combustion Engines and Centrifugal Pumps.—Universal Motor Company, Oshkosh, Wis. Three bulletins. The first, No. 16, is devoted to a 3-in. centrifugal pumping outfit driven by an internal combustion engine to handle water at heads up to 55 ft. A brief description of the outfit and the work it is designed to do are given, the text being supplemented by a number of engravings. The other two bulletins, Nos. 20 and 24, illustrate and describe a line of internal combustion engines for use in connection with electric generators or without. Descriptions of the various engines with illustrations are presented and condensed specification tables are included.

Drop Hammers.—Chambersburg Engineering Company, Chambersburg, Pa. Two bulletins. The first, No. 46A, calls attention to a line of steam drop hammers that are built with falling weights ranging from 400 to 20,000 lb. A brief description of the construction of the hammer is given and the text is supplemented by engravings of two of the different sizes. The second bulletin, No. 61B, refers to a line of board drop hammers with falling weights of from 100 to 2500 lb. The construction of the hammer is gone into at some length and engravings showing the general construction and the guards that can be supplied are presented. A condensed table of specifications for the various sizes of hammer are given, together with directions for setting, starting, regulating and operating.

Engine Lathe.—Sidney Tool Company, Sidney, Ohio. Circular. Pertains to a double back-geared, quick-change engine lathe, which is built in 17 and 19 in. sizes. A general description of the lathe is presented, together with an illustration and condensed specification table of different sizes. An illustrated description of the lathe appeared in THE IRON AGE, Feb. 10, 1916.

Profiling Machine.—Keller Mechanical Engraving Company, 70 Washington Street, Brooklyn, N. Y. Booklet No. 4. Embodies illustrations of work that has been done by an automatic profiling or die sinking machine with engravings and brief descriptions of the different types of machines. Among the advantages claimed for the use of this machine are an unlimited and uniform production at a reduced cost and a decrease in the amount of material that has to be scrapped as a result of using faulty dies. Condensed specifications of the several types of machines are included.

Grinding Machines.—T. P. Walls Tool & Supply Company, 75 Walker Street, New York City. Circular. Describes a single emery band grinding machine and a combination machine consisting of an emery band and a disk wheel. Illustrations of both machines are presented, together with brief tables of specifications of each.

Mechanical Stokers.—Laclede-Christy Clay Products Company, Manchester and Sulphur avenues, St. Louis, Mo. Folder. Concerned with automatic stoker equipment for power plants. The various advantages of the stoker are pointed out and an engraving showing it in use is presented.

Air Cooling and Cleaning.—Carrier Air Conditioning Company of America, Buffalo, N. Y. Bulletin No. 253. Covers the subject of cooling and cleaning air for generator and transformer ventilation. The construction of the company's generator cooler is described and the benefits obtained from its use touched upon. Special emphasis is laid upon the nozzles used which are of the non-clogging type. Dimension tables and diagrams and a partial list of plants in which the apparatus has been installed are included.

Magnesium Metal.—H. P. Binswanger, 30 East Forty-second Street, New York City. Pamphlet. Presents a brief statement of the uses of this metal in alloying, for illumination and for scavenging, particular emphasis being laid upon the savings in cost resulting from its use.

Gang Drilling Machine.—Automatic Gang Drill Machine Company, Los Angeles, Cal.; Hunt Engineering & Sales Agency, 322 Baker-Detwiler Building, Los Angeles, Cal., sales agent. Folder. Concerned with an automatic straight line gang drilling machine designed for structural steel fabrication and boiler, tank, bridge or ornamental iron work. A description of the machine which will drill any number of holes of any size, pitch and length in a straight line, is given, the text being supplemented by a number of engravings of the machine.

Traveling Screens for Water Intake.—Chain Belt Company, Milwaukee, Wis. Bulletin No. 64. Relates to a traveling water screen which was illustrated in THE IRON AGE, May 11, 1916. The principal uses of the screen are to remove refuse from water that is to be used for industrial purposes or to remove by-products from water leaving industrial establishments either for reclamation purposes or to avoid contamination of waterways. A description of the machine supplemented by views of installations is included.

Electric Hoists.—Sprague Electric Works, of the General Electric Company, 527 West Thirty-fourth Street, New York City. Bulletin No. 48,906. Pertains to a line of electric hoists that are built in two sizes having maximum capacities of ½ and 1 ton respectively. The fields in which these hoists can be used include machine shops, stockrooms, foundries and as auxiliaries to a traveling crane. The uses of the hoist in these several industries are briefly touched upon and this is followed by a set of specifications with illustrations and dimension diagrams and views of the various arrangements of carriage that can be furnished. A number of engravings showing the hoist in actual use are included.

Flexible Couplings.—J. R. Shays, Jr., 47 West Thirty-fourth Street, New York City. Folder. Describes and illustrates a flexible coupling that can be supplied in sizes ranging from a maximum bore of ⅜ in. up to 7½ in. Among the points upon which special emphasis is laid are ability to use the casing as a pulley for a belt connection to other machines and connection or disconnection without moving the shaft. A table of dimensions and ratings is included.

Steel Car Wheels.—American Steel Foundries, Chicago, Ill. Pamphlet. Size, 6 x 9 in.; pages, 32. Contains illustrations of a line of steel wheels for all classes of railroad service, the text being also supplemented by drawings showing the different wheel forms and a number of views illustrating various stages in the manufacture. The process of making the wheels is described at some length and it is pointed out that the advantages of a cast-iron wheel are retained with the additional ones of a saving in weight, a lessening in maintenance cost and absolute rotundity due to the treads being ground. Tables of the sizes that can be supplied are included.

Pumps.—D'Olier Centrifugal Pump & Machine Company, Philadelphia, Pa. Bulletin No. 1 of Series G. Relates to a line of pumps of the screw and centrifugal types. Illustrations of the various pumps are presented to supplement the text description and in a number of cases line drawings showing details of construction and curves of test results and characteristics are included.

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